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Re-Imagining Learning Scenarios

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Introduction

Our current times have been framed by the concept of the information age, sometimes also known as the computer age. In a networked society as ours, digital technology has touched and changed many aspects of day-to-day life. Several long-standing societal, business and institutional systems have either lost their relevance or have transformed beyond recognition, the music, banking and travel industries being excellent examples.

Education does not stand untouched and we observe emerging and declining paradigms, changing expectations from society, our students now framed as consumers, with new and emerging types of informal learning experiences (take MOOCs for example) and all too frequently operating in unstable economic and policy environments.

The powerful combination of the information age and the consequent disruption caused by these unstable environments provides the impetus to look afresh and identify new models and approaches for education (e.g. OERs, MOOCs, PLEs, Learning Analytics etc.). For learners this has taken a fantastic leap into aggregating, curating and co-curating and co-producing outside the boundaries of formal learning environments – the networked learner is sharing voluntarily and for free, spontaneously with billions of people.

How do we as a community of educators respond to these directions? What could it mean for learning and the changing socio-economic demands of society?

We are set a challenge to really understand our learning environments. To create and invent responses that are possibly not even thought of yet. Perhaps there are new business models, new policies, different ways to understand technological influences, new ways to interpret the collaborative and social-networked society that we live in: the learning environment, in its widest sense.

Following up on the results of the EDEN Research Workshop (RW8) in Oxford in 2014 and the Barcelona 2015 Annual Conference, a clear focus has been awarded to the expansion of emerging learning scenarios, identifying an ongoing shift towards greater attention to the importance of context in the learning process. The EDENRW8 report from Tony Bates highlighted that openness needs to go beyond the content-centred focus. What is driving the need for new approaches is the massification of higher education and the need to find new ways to create openness, which requires a greater focus on the contexts of learning. This implies an integrated approach to online education and the various ways of openness in education which are now developing.

More present core questions include the tension between human and machine approaches to learning – raising the important question of what in education is best done by humans and what by machines? New knowledge is also needed regarding how to combine scalability with personalisation, as well as about learning context and contextualisation.

The social and socio-economic context is more important than ever. Society itself can be understood as a learning environment, with questions of learners' connection with the community and the empowerment of the practitioners.

In the new learning environments, the core players and stakeholders – learners, educators, government bodies, educational and learning institutions – increasingly acknowledge the chance for constructive and positive changes.

How do we as a community of educators respond to these directions? What could it mean for learning and the changing socio-economic demands of society? What can we, the community of experienced educators, say about this?

The EDEN 25th Anniversary Conference in 2016 in Budapest aims to evaluate and invent better responses regarding these changing socio-economic demands, the functioning of institutions, the new tools and their usability, the collaborative learning cultures, digital pedagogy – in other words the learning environment in its widest sense.

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AN INVITATION TO LOOK AT ENHANCEMENT IN TECHNOLOGY-ENHANCED LEARNING

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The Internet, e-learning and now mobile learning are seen as opportunities for individual to access information and engage in learning anytime, anywhere. However, digital devices and technologies are also perceived as detrimental for learning (Dror, 2007), memory and attention (Watson, 2015). The role that they play in learning needs questioning.

Technology-enhanced learning (TEL) is the use of technologies for learning. The term appears almost systematically in research concerned with e-learning without being discussed in itself (Kirkwood & Price, 2014). To this end, there is a call for drawing more attention to the concept of enhancement, which is at the core of TEL, (Kirkwood & Price, 2014; Dror, 2008).

This paper proposes a discussion of the notion of Technology-Enhanced learning. Firstly, it will examine the definition of enhancement and highlight how learners could be cognitively enhanced. Secondly, it will discuss the role of technology in learning as seen in literature, and illustrate it mainly performs an enabling function, rather than an enhancing one. The paper argues that technology appears to have a real enhancing role when the cognitive abilities of the learner are taken into account. Based on these considerations, future research directions for TEL will be proposed.

Enhancement as a person-centred concept

This section introduces the concept of enhancement as person-centred event. It discusses the definition of enhancement as extended abilities for the individual, which can be reached by intervention on competencies, mood and performance. To achieve this, the person can be enhanced in a physical or cognitive manner. This work focused on cognitive enhancement and present different means to achieve it, among which technology.

The transhumanist movement defines enhancement as a way to extend intellectual, physical and psychological abilities of individuals, so that they can go beyond their naturally limited capacities to become transhumans (More, 2013). For transhumanists, enhancement is not about repairing disabilities and relieving individuals from suffering, but going beyond the realm of what we know as possible, in a quest for happiness (Bailey, 2013; Bostrom, 2005). As such, it has a transformative impact on the individual and aims to increase the capacities, the efficiency of individuals.

To extend the abilities of the person beyond possible, enhancement can have three objects: (a) the competencies of a person; (b) the state (mood) of a person; (c) the performance of a person. The realization of at least one of them is enough to enhance the individual (Baertschi, 2011). Baertschi (2011) establishes a link between the duration of enhancement and its impact: if one takes amphetamines before an exam, it's to enhance performance at a given moment. If one takes drugs regularly to increase one's attention, then it's to enhance a capacity or competency.

Types of enhancement and ways to achieve it

Competencies, moods and performance can be enhanced by intervening on the physical or cognitive abilities of the individual. Physical enhancement entails gaining new bodily capacities, for instance through addition of new limbs, and improving body resistance to achieve a radical extension of human health span and life expectancy. Cognitive enhancement instead is "the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems" (Bostrom & Sandberg, 2009). Enhancing cognition refers to "the processes an organism uses to organize information. This includes acquiring information (perception), selecting (attention), representing (understanding) and retaining (memory) information, and using it to guide behaviour (reasoning and coordination of motor outputs)", (Bostrom & Sandberg, 2009). To this end, three types of cognitive enhancement can be identified in relation to enhancing performance: (a) Enhancing separate cognitive processes; (b) Enhancing the process overall; (c) transforming the hierarchy of processes to make it more efficient. Similarly, it can have different objectives. For instance, enhancing the performance of the individual for a specific task at a specific moment, or enhance the cognitive abilities of the individual overall. Furthermore, aspects of physical and cognitive enhancement overlap as cognition is bodily-based. Notwithstanding the role of the body and perceptual senses in learning, the focus of this work is on cognitive enhancement (CE). Cognition, from the Latin *cognoscere*, which means to know. Thus, the processes which help individuals to learn, gain knowledge and skills, are the ones to be considered here.

Cognitive enhancement can be achieved through different means such as pharmaceutical, neurological, genetic therapy or technology. Pharmaceuticals like nootropics (neuro-enhancers) can be used and for instance, pills to increase memory or attention are available on the market. Through non-invasive neurological techniques such as brain stimulation and brain-machine interfaces, or through invasive techniques as neural implants, neuro-enhancement can be achieved. Also, gene therapy can be used to modify some traits hereditary traits or traits linked to learning. Finally, technology can be utilised to enhanced cognition. Bostrom and Sandberg (2009) outline several technological means to obtain cognitive augmentation; (a) internal software: learning improved cognitive strategies or making use of the plasticity of the brain; (b) external hardware and software: collective cortex, artificial intelligence, software agents; (c) intelligence augmentation: software, mediation "embedding the human within an augmenting shell such as wearable computers or virtual reality"; (d) smart environments. Regarding the variety of purposes involved in the use of

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these technologies, Bostrom and Sandberg (2009) argue information technology can "give an overview, keep multiple items in memory, and perform routine tasks. Data mining and information visualization tools help produce overview and understanding where the perceptual system cannot handle the amount of data, while specialized tools like expert systems, symbolic math programs, decision support tools, and search agents expand specific skills and capacities". While they highlight the role technology can play in the areas of perception, understanding and application of knowledge (decision making), our work focuses on the role of technology in enhancing the learner.

Enabling versus enhancing the learner

While technology can enhance cognition and therefore learning in many ways, two different roles for technology in learning can be identified: (a) Technology as an enabler of learning whereby learners are afforded access to learning material; (b) Technology as an enhancer of learning whereby learners' capacities and performance are improved.

Technology enables, but doesn't necessarily enhance the learner

In practice, the role technology plays in enhancing learning is often implicit rather than explicitly articulated (Kirkwood & Price, 2014; Dror, 2008). To this end trends which characterize the affordances technology offers learners are:

- Provides more access to information (mainly through the Internet).
- Provides more access to education by allowing them to enrol in classes in remote places (via for instance e-learning courses and MOOCS).
- Provides more access to learning, as people can learn anywhere and anytime using their mobile devices (via m-learning).
- Provides more access to other learners and enable learners to learn by interacting with each other. For instance, mobile learning and computer-supported collaborative learning (CSCL) examines way in which learners can find each other (Kukulska-Hulme et al., 2011).
- Provides contextualized instructions. Technologies like Augmented or Virtual Reality allow learners to learn by being immersed in the environment related to their task. It allows them to practice tasks they wouldn't have the possibility to practice for real without risk (Hung et al, 2015). It allows them to learn what to do in this environment (Lee & Akin, 2011).
- Technology makes knowledge less abstract through visualization. For instance, augmented reality has been used to improve spatial abilities of learners, which are required for better understanding of geometry and mathematics (Kaufmann & Schmalstieg, 2003).

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Not all these points relate to enhanced learning. Indeed, they do not all refer to learning itself. First, increased access to information doesn't mean individuals process that information in such a way that they gain new knowledge out of it. Information can be perceived, but not understood, memorized or applied. Second, contextualized or digitalized instructions may not lead to gaining skills. Indeed, it is merely about following what the technology instructs the user to do, without necessarily understanding the logic behind the instructions and steps to take. The depth of understanding is questionable. Moreover, Dror (2007) highlights that by providing too much to the learner, technology present the risk of reducing the depth of processing and memory in learners themselves.

What is related to learning here is getting more access to learning. Learners can engage in learning whenever and wherever they want, gaining flexibility. But this doesn't necessarily lead to increased efficiency, improved cognitive skills and learning.

The second point related to learning is the way knowledge is made less abstract by the means of visualization techniques. This is related to improved understanding, and in turn better learning.

To summarize technology would have an enabling role – it enables access to learning, information, and enables users to perform specific tasks – and an enhancing role, linked to improved understanding of concepts.

Technology enables the learner when it looks at cognitive processes and performance

We will discuss what has been identified as enhancement in TEL research and show that even though enhancement has not been a core concern so far, there is literature documenting improved cognitive processes and learners' performance.

Kirkwood and Price (2014) conducted a literature review on TEL. They highlight that the type of enhancement to be offered through the technology is not intentionally stated in the work. A posteriori analyses allows to highlight 8 ways in which enhancement can be conceived in TEL: (a) increased flexibility, (b) improved retention (memory), (c) improved engagement or time spent on a learning task, (d) more favourable perception or attitudes, (e) improvement in test and assessments, (f) deeper understanding, (g) more reflexion or critical awareness, (h) improved interaction online and sharing experiences.

These aspects of enhancement overlap with the cognitive processes transhumanists describe. For instance, memory and understanding can be improved. Improvement in assessment also denotes of increased learning efficiency.

But there are also aspects that do not necessarily relate to enhancement. Indeed, there is little to no evidence that increased flexibility, engagement, attitude, and increased interaction translate in better learning outcomes. Kirkwood and Price (2014) underline that while current

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literature uses "quantitative measures that may be easy to capture, they contribute little to no understanding how (…) can promote qualitative developments in learning".

We are facing a double issue here. First, cognitive processes have a direct impact on learning outcomes, and thinking of how to enhance them is de facto linked to enhancing learning, while some other variables such as participation, flexibility, may have an indirect impact on learning outcomes and efficiency. Second, the evidence used in TEL literature is not always conclusive. Because enhancement is not intentionally designed, evaluations use sets of measure that are not efficient in proving enhancement itself. There needs to be more reflexion around TEL at technology design and evaluation stages.

Directions for further developments

This section opens up directions for TEL research. We discuss how cognitive enhancement can be integrated to technology design processes. As enhancement is not neutral on the individual, risks have to be considered.

Need to integrate intended enhancement to technology design

Enhancement must be integrated to technology-design processes. Xia and Maes (2012) propose a framework for designing intelligence augmentation. They suggest considering the desired state after enhancement, the processes at stake for the tasks, can the role of the technology on the processes (or hierarchy of processes).

Although this approach can serve as a roadmap, there is still a lack of guidelines on what is to be enhanced and how to approach that decision. Indeed, in a specific situation, being able to forget something might be an enhancement, while in others enhancement may come in the form of better memorization, for instance. For design to integrate enhancement, there must be clarity in the impact sought, but also on the time-frame of that impact. Is the artefact impact memory for a specific moment, or is it touching to memory as the overall ability of the learner?

Another challenge is linked to understanding the type of enhancement needed by different learners – adults and children are at different developmental stages and face different cognitive challenges.

The setting in which learning is occurring, and the presence of a teacher might influence ways to improve learning. The depth of learning looked for, depth of understanding, has be accounted for.

Finally, the learner's familiarity with the task or learning topic will have an impact on the enhancement needed from the technology to improve his/her performance.

There is so far little understanding of the impact these different variables would have on designing enhancement and no guidelines in terms of technological affordances, features, that

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would be needed to enhance learners. There's also very little understanding of how to assess the efficiency of technologies regarding their enhancing character.

Need to develop thinking about how we assess artefacts for TEL

Evaluations of TEL present three types of shortcomings, which might hide the risks involved in using technology to intervene on cognitive processes.

First, as mentioned above, evidence collected during evaluation of technologies for learning and learners' assessment is often not appropriate from an enhancement perspective. Reflexion around the meaning of increased learning efficiency has to be carried out. Dror (2008) underlines that "too often 'learning' is reduced and limited to acquisition of information", whereby efficiency equals the number of things learnt. But the notion of efficiency linked to enhancement has also been discussed concerning intelligence augmentation as allowing to comprehend/solve problems better, faster and in new ways. A technology-enhanced learner would have to learn "better" (quality of learning), faster, and be able to apply knowledge to do new things (Engelbart, 1962).

Second, evaluations do not consider long-term persistence of learning outcomes (Kirkwood & Price, 2014). Evaluations occur right after technology usage. At best, short term memory is tested. But there is no evidence of TEL systems allowing users to get better memory long-term, knowledge and understanding of the concepts a while after discovering them with technology.

Thirdly, the impact of technology use on cognitive processes over time hasn't been a concern so far. However, Dror (2008) underlines that the loss of devices is lived as the loss of one's own cognitive capacities and (Dror, 2007) that by providing too much to the learner, technology presents the risk of reducing the depth of processing and memory in learners themselves. This would in turn create a need for enhancement and lead users to use even more technology, as a consequence of being diminished by the technology.

Besides what is perceived consciously by the learner, some developmental processes can be at stake. Indeed, using technologies changes the way we develop by modifying our physical activity and the structure of our brains. These changes could hinder or even prevent some developmental stages as we know them today – if kids do not develop precise locomotor skills because they learn through tablets instead of playing with smaller toys, will they be able to acquire the same precision of movement that we can now have? Will it have an impact on their cognitive abilities overall? Without calling for a precautionary or proactivity principle, we argue that enhancement and its potential downsides must be considered by developers for more ethical technology development.

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Conclusion

Enhancement for learners resides mainly in cognitive enhancement, that is increased efficiency of cognitive processes such as perception, attention, memorization, understanding or applying knowledge. By improving one or several processes, one improves the learning outcomes for the learner. TEL literature highlights affordances from technology for learners, such as access to information, other learners, education, which are enabling learners. It also identifies some areas of enhancement, linked to cognitive processes but also to variables more indirectly related to learning efficiency. Enhancement has to be considered at a technology-design design stage for TEL to be effective, and to allow better assessment. An important downside of enhancement is the impact that enhancing one skill has on parallel or depending cognitive skills which development could be impaired, and the enhancement of the learner overall through time. Transdisciplinary research bridging such disciplines as learning, cognitive sciences and neurology is needed to illuminate the impact of enhancement technologies on the brain and learning overall. Studies that consider enhancement in a longitudinal perspective are required to guide educational practices and leverage the power of technology at the most.

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VALIDATION OF NON-FORMAL LEARNING: OPPORTUNITIES FOR DISTANCE EDUCATION

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The vast array of educational resources available on the internet means that individuals can access learning opportunities in a way not previously possible. But how can this *free range learning* (Cross, 2007) be translated into formal qualifications or credentials? Some of innovative distance learning opportunities are already being formally recognized. For example, many higher education institutions offering MOOCs are increasingly providing an opportunity to earn academic credit towards a degree, such as in the Virtual Mobility Passport project (Tovar, 2014). Nevertheless, much learning from online educational resources remains invisible on a transcript or resume. In *Edupunks' Guide to a DYI Credential*, Kamenetz (2011) posited that a motivated learner can use internet learning to earn q credential from a recognized formal education institution. The vehicle that she recommends to have such learning assessed and accredited is called Validation of Non-formal and Informal Learning (VNFIL) in Europe.

VNFIL, by no means new in Europe, has gained a new significance with the development of qualification frameworks (Harris, 2011). The growth of qualification frameworks in Europe has been exponential; there were three frameworks in 2004, now there are at least 36. VNFIL has been identified as a European priority on repeated occasions, notably in the Communication on Lifelong Learning (2001), the Copenhagen process on increased cooperation in VET (Declarations 2002, 2004, 2006, 2008 and 2010), in the Recommendation on the European Qualifications Framework (2008) as well as in the ministerial declarations of the Bologna process (2007 and 2009). Alongside these general landmarks has been a raft of specific policies. According to the recent Inventory on Validation (Cedefop, 2014; p.5)

> *"Prior to 2010, various steps had been taken to stimulate and guide developments in the area of validation in Member States, including the 2004 Common European Principles [...] the 2008 Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning, [...] and the 2009 European guidelines for validating non-formal and informal learning…"*

The Inventory then notes that the most important development in the European context since 2010 has been the adoption of the 2012 Council Recommendation on the validation of non-formal and informal learning. This calls for Member States to put in place, by 2018, arrangements to enable individuals to have their knowledge, skills and competencies acquired via non-formal and informal learning validated, and to be able to obtain "a full qualification, or, where applicable, part qualification on the basis of validated non-formal and informal learning experiences".

In this paper, we seek to unpack concrete actions and practical initiatives in relation to the recognition of non-formal learning (RNFL) as a distinct and discrete part of VNFIL. We describe current opportunities available in Europe for providers of non-formal (NF) distance education to have their offerings formally recognized, through a process termed generically as program review. The process of awarding institutional credit for pre-assessed training from selected employers, private training organizations and/or Continuing Studies programs is termed *program review*. A systematic approach to gauging levels and specifications of credits, program reviews provides an effective way to scale up VNFIL by operating at the level of the qualification rather than the individual. Although these initiatives are not specific to distance education, they do offer providers of distance NF education a chance to enhance the stature of their offerings, increasing the value to both learners and themselves.

Methodology and terminology

This paper is based on desk research and on informal enquiries sent to a selected group of VNFIL-related policy-makers and practitioners in Europe. Proceeding in an iterative way, after a preliminary literature review, more focused email contact was made with key individuals who in turn, made referrals to colleagues and members of the European Qualifications Framework Advisory Group (EQF AG). This led to new literature and further contacts.

Generally, a consensus exists that NFL is intentional (on the part of the learner) and that is not currently part of formal, regulated education and training provision. Some definitions (e.g. Cedefop, 2009) refer to NFL as 'not explicitly designated as learning (in terms of learning objectives, learning time or learning support)', whereas others take the position that NFL is planned and supported pedagogically, whether at a distance of face-to-face. Moreover, definitions vary as to whether to qualify as non-formal the learning needs to have been subject to some form of assessment, quality assurance or certification. Given these contestations, the definition adopted here follows the Scottish Credit and Qualifications Framework (SCQF) and is deliberately broad: NFL is learning that "is organised but may or may not be certificated, and which may or may not be recognised on the SCQF":

> *"This type of learning could be gained through a range of organised learning experiences, for example training which is organised by your employer or a community learning programme. Learning of this type normally has clear learning objectives and some learning support would normally be provided (for example workshops, presentations, or project work). It may or may not be assessed. Learning of this type is normally delivered outside of formal learning institutions such as schools, colleges or universities, although sometimes learning may take place using the facilities of these institutions" (SCQF, 2015).*

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Recognition of non-formal learning (RNFL) at systemic and national levels

While individual institutions often recognize NF education delivered through distance (e.g. Thompson Rivers University in Canada accepts Microsoft certifications for academic credit), national systems are an emerging trend. The United States (US) has long-established and well-documented mechanisms for RNFL. The Credit Recommendation Service (CREDIT) of the American Council on Education is a national player, alongside numerous nationally standardized exams (CLEP, DANTES etc.). Initiated in 1974, CREDIT has assessed over 4000 programs, recorded in their searchable, on-line database, and has a network of over 2000 colleges and universities that accept their credit recommendations for NF offerings. For example, *Saylor Academy*, a non-profit provider of on-line open courses, has had some of their offerings reviewed and recommended by CREDIT, as has *Straighterline*, a for-profit provider of on-line courses at the introductory college level.

South Korea has an established Academic Credit Bank System (ACBS) since 1998, which had served 50,000 learners by 2013, offering credits for non-formal learning towards Associate and BA degrees (Park, 2011). ACBS certifies NF training; the process allows the recognition of distance education courses/programs for academic credit.

In Europe, evidence does suggest that RNFL is relatively under-developed as a systematic, national practice. Perhaps the most important recent initiative was a 2014 conference held in the United Kingdom *Making Learning Visible*. The conference demonstrated that RNFL is gaining a distinct place, on its own terms, separate from the recognition of informal learning. Referring to the opening up of qualifications frameworks to non-formal certificates and to international qualifications, keynote speaker Jens Bjornavold noted: "I would say approximately half the countries are working seriously on this question – how can we involve qualifications from the private sector, from the voluntary sector, from international organisations, how should we do that?" (EC, 2014a; p.60). The conference and final report highlighted program review-type initiatives in the European Community (EC, 2014b).

In England, Wales and Northern Ireland, an *exemption facility* allows individuals with certified non-formal achievements to progress within the Qualification and Credit Framework (QCF) but without being awarded official credit. Exemptions can be initiated by awarding organisations (i.e. bodies providing accreditation) or by individual learners. The procedure involves the awarding body having "a process for determining the quality of any units, qualifications or other certificated achievement awarded outside the QCF". In the UK, awarding organisations are regulated by the Register of Regulated Qualifications. Awarding organisations include universities and colleges (public and private), occupational bodies, professional bodes and agencies, and skills councils. Because the exemption facility is related to the QCF as a whole, it is highly regulated, complex and consequently, used primarily by large-scale training vendors such as Pearson Education.

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The Open College Network (OCN) in the UK has a rich and very collegial history (since the 1970s), offering recognition and accreditation for a range of locally designed learning programmes delivered through distance and face-to-face, in a range of settings, including workplaces, voluntary and community organisations (UDACE, 1992; p.28). The OCN accreditation framework consists of four levels (based on complexity and autonomy), an agreed definition of credit, recognition by peer group panels, and mutual recognition of the credits issued by all members of the National OCN. NF education can be mapped onto units/learning outcomes at different levels and credited accordingly. When populated with such programs, the accreditation framework has increasingly acted as a curriculum framework and a menu from which to construct more programs, packages of learning or specific learning interventions designed to fill gaps. Many OCN providers have subsequently become formalized as awarding organisations offering regulated qualifications alongside the recognition of non-formal education programs.

In Wales, an inclusive national framework, the CQFW, the Credit and Qualifications Framework for Wales, embraces all types of learning and allows:

> *"comparison of achievements from different education and training activities, recognition of full and partial completion of qualifications and brings in the vast range of education and training activity within and outside the regulatory and funding arrangements" (EC, 2014b; p.33).*

Learning programs are categorized as: higher education, general and vocational education, or lifelong learning. But it is only the lifelong learning *pillar* that takes account of non-formal learning. An agreed national approach builds on OCN Wales through a framework now called Quality Assured Lifelong Learning (QALL): "The QALL process will measure the learning that has taken place, quality assure it and award credit for it". To be recognized within QALL, learning has to be captured in *units*. Providers of, for example, in-house company training or continuing professional development usually work with a *Recognised Body* to draft these units which are then submitted for approval. Once units are approved they can be used by other awarding organisations.

In Scotland, the Scottish Credit and Qualifications Framework (SCQF) is "a lifelong learning Framework that includes an increasing range of general, vocational and academic qualifications and learning programmes", including non-formal learning (EC, 2014;, p.49). Over 400 NFL programs are already registered on the SCQF database, from levels 2 to 11, ranging from 10 to 1000 notional learning hours. Providers of these programs include employers, trade associations, trade unions, youth organizations, community organizations and adult education organizations. Each non-formal program is awarded a level and a number of credit points. This is called *credit rating* and is undertaken by Credit Rating Bodies (CRB). All further education colleges and higher education institutions are CRBs, as is the Scottish Qualifications Authority (SQA), and a number of approved bodies such as City and Guilds. All CRBs have to have robust quality assurance systems that are moderated by an external quality assurance body. To qualify for inclusion in the Framework, a non-formal learning

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program needs to be outcome-based, more than 10 hours (one credit), formally assessed, and, internally and externally quality assured. Microsoft followed this route to formalize some its on-line certificates, working with the University of the West of Scotland as CRB; each recognized certificate is evaluated at Level 5 (Associate Degree) of the European Qualification Framework, worth 15 credits.

In the Netherlands, NFL qualifications can be recognized on the Netherlands Qualifications Framework (NLQF). Since 2013, the NLQF has adopted a binary system: (a) qualifications regulated by the public sector i.e. ministries, and (b) *other qualifications* i.e. non-formal qualifications awarded by the private sector, outside the formal system, and related to the labour market. It is argued that the inclusion of the latter in the NLQF will "increase their visibility and further strengthen their value" (EC, 2014b; p.63). The format for *other qualifications* is based on sector standards, encompassing *function profiles*, *career-paths* and *citizenship-activities*, and involving labour market stakeholders in their derivation – therefore closer to employers and their needs. The classification of non-formal qualifications into the *other qualifications* arm of the NLQF consists of two stages: (a) an *audit* or accreditation of the provider organization, particularly its quality assurance procedures; (b) after being accredited for five years, the organization can submit its qualifications for approval, indicating "the qualification level it sees as most appropriate" (EC, 2014b; p.64), the learning outcomes oriented to the NLQF level descriptors, the notional workload involved, and the assessment procedures – which are evaluated by expert committees, and if successful, placed on the register. To date, ten companies and nine qualifications have been registered in this way.

Recognition of non-formal learning in particular sectors and professions

There is evidence that an increasing number of professional bodies wish to register their non-formal education or training in qualifications frameworks "enabling national and international recognition" and permitting them to present a transnational picture when marketing their programs. Armstrong and Fukami (2009; p.543) argued that:

> *"Accreditation of non-formal management education and development programmes is only half of a measure, necessary but not sufficient. It is time also to look at the other end of the pipe: What competencies are actually acquired by graduates of the non-formal management education and development programmes? [...] [T]he institutional arrangements and basic infrastructure for quality assurance for this sector are yet to be completed".*

The authors point to a need for third-party, profession-specific organizations to quality assure and enhance all aspects of the design and delivery of non-formal learning programs, citing ACCET in the US which specializes in guidelines for continuing education, and accredits training from trade and professional associations, corporate training departments and trade unions. But, 'looking at the other end of the pipe' suggests that providers of NFL may choose to formalize their own offerings rather than rely on a third-party to do that with/for them.

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Discussion and conclusions

We have briefly reviewed European initiatives that offer providers of distance education to have their non-formal offerings recognized towards formal qualifications. While these opportunities are also available to face-to-face providers, distance education and particularly open distance education is much more likely to attract free-range learners who later want to have their learning recognized. The emerging opportunities for recognition through a VNFIL process of program review are thus particularly germane to distance education providers of NFL.

On the plus side, formally recognizing non-formal learning programs advances a strong message about credibility, ownership and value for providers. It helps employers to understand the amount of learning, knowledge, skills or competence needed to achieve the qualification. It aids marketing, and extends the reach of programs to local, transnational and international markets. It encourages partnerships between different levels of provider. It becomes possible for tailor-made programs related to specific learners and fields of learning to gain visibility and currency. Trainers and assessors involved in NFL can become up skilled by the support they are given. Most importantly, it facilitates progression for learners.

There are obvious challenges associated with RNFL. To be formally accredited, especially directly into a framework, NFL programs and providers have to be subjected to the same regulatory processes as formal learning. This involves learning outcomes, and assessment and validation processes that satisfy quality assurance requirements. It also necessitates resources, expertise, capability and capacity. It was noted in the 'Making Learning Visible' conference discussions that some NFL programs may not make it into a framework not for lack of quality, but for lack of administrative expertise. Questions of final ownership of the qualification are also raised.

Although European qualifications frameworks and credit systems are increasingly open to registering the outcomes of non-formal learning, the current state of play is mixed. Long-standing voluntary and non-regulated initiatives such as Open College Networks (in the UK) have stood the test of time, for over four decades. Although some of them have become formalized as awarding organizations (or their equivalent), their role and the role of other third-party organizations in managing, endorsing or mediating the process of recognition or accreditation of non-formal learning has remained constant, be that at systemic, institution, sector or profession levels.

It is clear that more flexible and less formalized arrangements unquestionably suit certain constituencies and stakeholders e.g. employers who do not wish or need to be subjected to layers of verification and bureaucracy, especially when their programs change:

> *"Organisations that have chosen to put their own non-formal programmes into the Framework in Scotland and Wales don't always want to make the shift across to formal qualifications as it actually places extra constraints on the qualification and closes down the innovation. They want to stick with*

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> *what they have because they own it, they shape it and they don't have to conform to a particular size, shape or structure." (EC, 2014a; p.46).*

Questions continue to be raised regarding the efficacy of regulating non-formal programs: as a participant at the *Making Learning Visible* conference put it, "our need to regulate is perhaps greater than the learner's need to have a regulated qualification" (EC, 2014a; p.45). On the other side, concerns are expressed about whether RNFL puts the quality, the credibility of the frameworks and national qualifications at risk, and whether certification is becoming more important than learning. Much depends on the nature of the Framework it seems.

David Raffe's (2013) taxonomy of qualifications frameworks is extremely pertinent in terms of understanding the most suitable approach to RNFL. He distinguishes between three types of framework:

1. A *communications* framework that starts from an existing system, (re)describes it, aims to make it more transparent, supports rationalisation and coherence. The framework is seen as a tool for change rather than a driver of change.
2. A *reforming* framework also starts from the existing system, aims to make it more transparent but also to achieve specific reforms, e.g. fill gaps, improve quality, update standards. The qualifications framework therefore provides an opportunity to change existing education and training and becomes a reference point for reform. In such cases the framework is given a regulatory role where it will directly influence the design, provision and award of qualifications.
3. A *transformational* framework starts with a vision of a desired future system and aims for radical change. The framework defines the qualifications it would like to see in a transformed system assumes a strong central role as a driver of change.

According to the Cedefop (2009), the SCQF is a communications framework; England, Wales and Northern Ireland fall the reforming category (as does France and the Republic of Ireland). Transformational frameworks tend to be adopted in countries where the existing education and training systems are weak or not trusted (as in South Africa for example). The general view is that communications frameworks are more successful, but of course that may be because they are less ambitious. Evidence suggests that RNFL works best with communications frameworks that are less strongly regulated, such as the SCQF, where, it is hoped, credit decisions can be based on slightly more pragmatic criteria i.e. on agreements to treat particular qualifications as broadly equivalent, regardless of differences of content, rather than be based on technical criteria where more fundamental technical work is needed to identify exactly what each qualification represents, and to agree equivalences on that basis. In essence, RNFL is not used as much as it could be, and where it is it is mired in bureaucracy. As a result, much learning remains unrecognized.

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Given that European countries are increasingly emphasising the need to recognize the full range of an individual's knowledge, skills and competences, individualized approaches are not an adequate means to meet this challenge. There is a need and a place for more initiatives that recognize non-formal education and training, such as the OCN. By that we mean, loosely regulated, third-party arrangements that can deploy the pragmatic criteria referred to above, that can work by consensus from the bottom up, fit-for-purpose quality assurance processes can be used, numbers can be kept small initially so that non-formal learning processes can be easily managed.

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ACADEMICS' USE OF ACADEMIC SOCIAL NETWORKING SITES: THE CASE OF RESEARCHGATE AND ACADEMIA.EDU

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Introduction

In the past few years, the Internet has seen the advent of academic social-networking sites (ASNS) such as Academia.edu and ResearchGate. These sites allow users to upload academic articles, abstracts, and links to published articles; track demand for their published articles; and engage in professional interaction, discussions, and exchanges of questions and answers with other users. The sites, used by millions (Mangan, 2012), constitute a major addition to scientific media.

This study investigates the nature of the use and the perceived utility of the sites for academics whose professional careers are based on the performance and publication of studies. In a world that offers numerous and diverse online publishing opportunities (sites of formal journals, personal sites and blogs, and general social networks such as Facebook and LinkedIn), the question is what comparative advantage academic networking sites offer and why faculty members use them. Do these sites fit the definition of "social network"? And which of their affordances serve their users?

Literature review

In recent years, professional networks that offer information sharing and communication tools for professional purposes have arisen alongside the general social networks. The best known of them is LinkedIn (LI), which provides a platform on which people and businesses communicate for purposes of working relations, employee search, and career management. Among the additional Academic Social Networking Sites (ASNS) that have evolved in recent years, two-Academia.edu and ResearchGate – offer themselves as professional and social networks of researchers, combining characteristics of social networks with the publication of studies, all adjusted to the needs and comportment of academic researchers (Ovadia, 2014). They accommodate customary social-network elements such as the construction of a personal profile and interactivity with peers along with specific tools for academic requisites, such as uploading and tagging of articles and tracking of citations (Jordan, 2015).

ASNS have the potential of revolutionizing the patterns of information publication and sharing in the academic world. By offering platforms for interrelations among scholars around the world, they may influence the structure and dynamic of the research community.

Official academic publishing is based on acceptance of articles by refereed academic journals – either in print or in online academic databases that are accessible mainly to those who are active in an academic establishment – for which a fee is usually charged. The time that passes between research and the publication of its findings in such a journal is lengthy and may exceed one year. Academic social networks challenge this model and circumvent the hurdles that impede exposure to the public. What is more, they do so easily and at no charge. They encourage authors to upload full-text articles that appeared in academic journals, lectures presented at conferences, and even drafts, and make them accessible to the public (Wilkinson et al., 2003). They also allow readers to respond to an article or ask the author about it (Thelwall & Kousha, 2014), thereby encouraging interaction between readers and researchers.

The literature relates to five main affordances of academic social networks for researchers:

1. *Management of an online persona*: In ASNS, in addition to basic personal details, the researcher may present his or her professional experience, ideas, and capabilities, including the number of citations and downloads of his or her articles, thereby cultivating an online identity and promoting his or her professional reputation (Barbour & Marshall, 2012).
2. *Diffusion of studies*: The platform provides a place where account holders can upload articles to the cybersphere. In this manner, knowledge about a new article rapidly reaches the community that takes an interest in its topic and, accordingly, may be read (Espinoza Vasquez & Caicedo Bastidas, 2015).
3. *Collaboration*: The ability of ASNS to bridge distances encourages cross-disciplinary and cross-border collaborations. Some scholars argue that academic social networks replicate, and in certain cases even improve, the experience of social activity at a conference by helping to create and expand researchers' professional networks (Kelly, 2013). The two networks discussed in this study provide tools (e-mail and internal messaging systems) for direct communication and presentation of details for the establishment of personal relations among researchers.
4. *Information management*: Veletsianos (2013) suggests that ASNS serve as a source for the collection and organization of personal academic information including ideas, drafts, and anything else that a researcher on the network gleans from articles, references, and citations.
5. *Measurement of impact*: Academic impact is measured in terms of the number of citations of an article and the quality of the journals in which the article appears. Online academic networks offer additional metrics, such as number of persons who read or download an article (Gruzd, Staves, & Wilk, 2011).

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Employing the uses and gratifications theory to analyze the use of web sites and social networks

The uses and gratifications theory, an outgrowth of leisure-culture and mass-media studies, posits that media consumers are autonomous and active agents who base their consumption media decisions on a range of personal considerations and cognitive, affective, and social needs. The theory offers a contrast to the critical perspective, which sees media consumers as passive agents who are prone to media manipulations and influences (Rubin, 2002; Katz et al., 1974). It identifies five major types of needs to which media respond:

1. Cognitive needs, including consumption of information and knowledge.
2. Affective needs, including excitation, enjoyment, and pleasure.
3. Social needs, including creating a sense of group belonging, influencing and contributing to others, etc.
4. Individual needs, including the response to personal needs, self-promotion, personal gain, and enhancement of personal confidence.
5. Escapist needs, i.e., using the technology to flee from reality and create an alternative virtual and imagined reality.

The uses and gratifications theory helps to understand the behaviour of those who visit user-generated content sites such as YouTube, Wikipedia, and social networks. Research on users' behaviour in these environments divides the use of the sites into three types: consumption of information, participation in social interaction, and creation of information (Shao, 2009). According to Stafford, Stafford and Schkade (2004), the singular characteristic of the gratifications and users that typify recourse to the Internet, as opposed to the use of television and other traditional media, is the centrality and the interactive characteristics of the social gratification. Studies on the uses and gratifications of participants in social networks reinforce this point; they repeatedly stress the centrality of the gratification created by *communicating with friends*, establishing relations with existing friends, and finding old or new friends (Raacke & Bonds-Raacke, 2008; Park, Kee, & Valenzuela, 2009). Seidman (2013) notes the centrality of the social calculus as a motive for the use of social networks. The social element, he says, relates more to the need for *a sense of belonging* than to the need for interaction. Other research, among students who use Facebook groups, indicate that one of the gratifications derived from the use of FB is *self-promotion* and the *acquisition of social status* (Park, Kee, & Valenzuela, 2009; Ellison, Vitak, Gray, & Lampe, 2014). Additional studies that look into the gratifications that people seek when they use social networks specify the need for *ego-bolstering* as a principal one Another gratification that typifies the use of social networks is "killing time" and *escapism* (Quan-Haase & Young, 2010).

This study attempts to explain the potential of academic Web sites and create a profile of their use. Given the scanty attention that empirical research has devoted to ASNS to date, this study may enhance our understanding of the allure of these sites and academics' motives for using

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them. We emphasize two questions in particular: Which motive, the social or the personal, is stronger in using ASNS, and to what extent do users refer to ASNS in ways that are familiar and known in reference to social networks?

Research methods and tools

The research was design to investigate what are the reasons for using ASNS by academics. The following operative questions were stated:

1. What are the characteristics of academics' use of ASNS?
2. What main gratifications do academics obtain by using ASNS?
3. What is the relation between frequency of use and nature of use of ASNS?

This is a quantitative study, based on a survey among faculty members at three different academic institutions in Israel – two colleges and one university. For the purposes of the study, a dedicated questionnaire was constructed, composed of three main sections: Users' demographic characteristics, characteristics of the use of academic networks and motivations for use.

The questionnaires were sent to all faculty members at three institutions. Eighty-one faculty members responded – 57% men and 43% women. They were fifty years old on average (SD = 10.3), ranging in age from twenty-nine to seventy-two. The rate of participant ownership of an account on social-networking sites and academic-networking sites is shown in Figure 1.

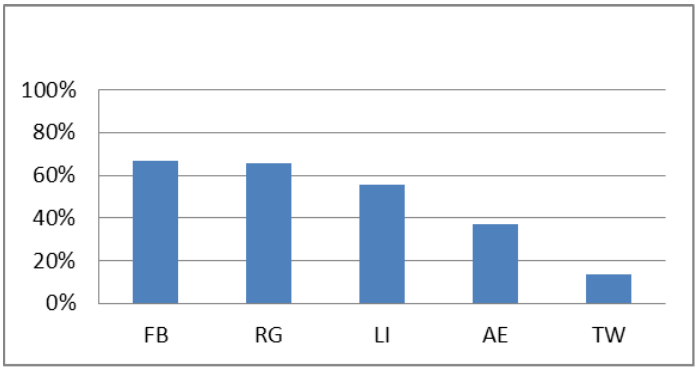

Figure 1. Rate of Account Ownership on Social-Networking Sites

Some 75% of respondents have at least one account with one of the two academic-networks chosen for this study (RG/AE); 25% have accounts with both. The preferred academic network among Israeli academics is ResearchGate, with which more than 65% have an account. The percent of those with an account on RG approximates that of those who have a presence on FB – 67%. Only 37% have an account with AE, 56% have an account with LI, and only 14% have one with TW.

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Findings

q1. What are the characteristics of academics' use of ASNS?

Longevity of use

About 42% of those who have accounts with ASNS (N = 59) have had them for more than two years. Some 30% subscribed approximately two years ago, 13% joined the networks in the previous year, and 13% did so the previous half-year.

Frequency of visits to ASNS

Some 38% of those who have accounts with ASNS (N = 60) visit the sites infrequently, 20% do so once per month, 27% visit approximately once per week, and 15% do so almost every day.

Nature of use

To examine the way academics use ASNS, the participants were shown a list of possible modes of activity on each of the two academic networks. The list was composed of six items aggregated into three variables, two items per variable (information consumption, information sharing and diffusion, and interaction with other users). The participants were asked to rank the extent to which they engage in these activities on a five-level Likert scale (1 = *not at all*; 5 = *to a very great extent*). Table 1 presents the findings.

Table 1: Use of ASNS

	Mean	S.D.
Information consumption	2.48	1.1
Information sharing	2.02	1.00
Interaction	1.82	1.00

The table shows that the most common form of activity is information consumption (M = 2.48, SD = 1.11), followed by *information sharing* (M = 2.02, SD = 1.00) and *interaction* (M = 1.82, SD = 1.00). To refute the null hypothesis, an Anova test with repeat measurements was performed, yielding a significant difference among the three groups ($F(2, 57) = .71$ $p < 0.001$). The reason for the difference is that the *information consumption* use is significantly more common than the *information sharing and diffusion* and *interaction* uses.

q2. What main gratifications do academics obtain by using ASNS (acquisition of information and knowledge; enjoyment; group belonging; self-promotion; escapism)?

To answer this question, the participants were presented with twenty-six possible motives for ASNS use. The motives were derived from the uses and gratifications theory and adjusted to the context of social-network use. The participants were asked to rank the extent of their identification with each motive on a five-level Likert scale (1 = *not all*; 5 = *very much*). The factor analysis detected five main groups of gratifications: Self-promotion and ego-bolstering ($\alpha = .964$), Acquisition of professional knowledge (= .941), Belonging to professional community ($\alpha = .889$), Interaction with professional peers ($\alpha = .905$), Escapism ($\alpha = .945$).

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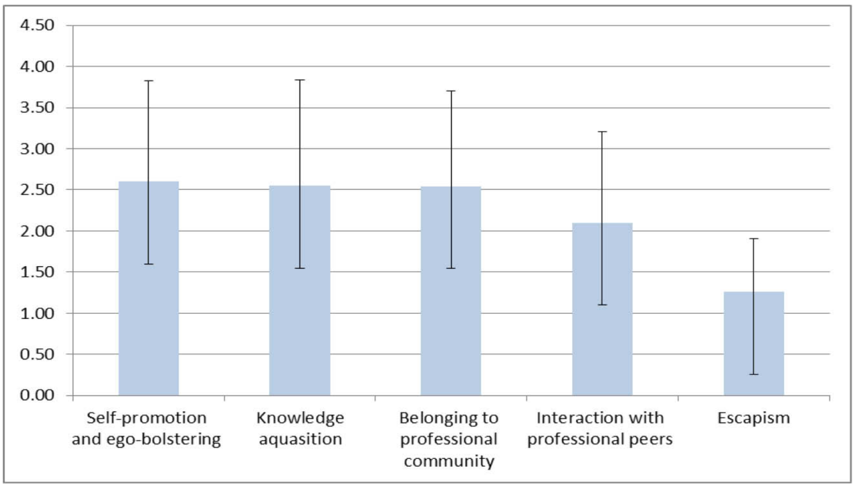

Figure 2. Presents the ranking of the uses and gratifications obtained from ASNS

To check for the presence of significant differences among the four principal motives (self-promotion, acquisition of professional knowledge, belonging to an information community, and interaction with others), an Anova test with repeat measurements was performed among the four complex indicators (the mean of the statements in each factor). The findings show significant differences among the various kinds of gratification and, specifically, that *interaction with professionals* is a significantly less important gratification than *self-promotion and ego-bolstering* and *belonging to a peer community*.

q3. What are the relation between frequency of use and nature of use?

A relation was found between frequency of ASNS use and participant's age. Namely, the older an academician is, the more frequently he or she uses the network ($r = .413$, $p < 0.005$). A relation was also found between frequency of use and each of the three types of uses: Information consumption ($r = .771$, $p < 0.05$), Information sharing ($r = .570$, $p < 0.05$), Interaction ($r = .406$, $p < 0.05$).

Conclusions

This study investigates the uses and gratifications that academic faculty members derive from two academic social-networking sites, Academia.edu and ResearchGate. It invoked the uses and gratifications theory (Katz, Blumler, & Gurevitch, 1974) as a point of departure and adjusted this genetic theory, developed in the context of mass-media consumption, to the specific context of academic networks and their singularities.

The study was conducted among a relatively small population from three different academic institutions on the basis of a voluntary response to an online questionnaire. It found a difference among these institutions in the extent of use of the various networks and faculty members' perception of the gratifications that the networks give them.

The findings indicate that researchers use ASNS mainly for consumption of information, slightly less for sharing of information, and very scantily for interaction with others. This finding itself indicates that academic networks do not function as other social networks do. In

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social networks such as Facebook, interaction with others is the main use (Boyd & Ellison, 2007); academic networks, in contrast, are used chiefly for information consumption and are perceived more as a database of sorts than as a place to establish social or professional relations and interact with others.

As for the gratifications that motivate users to visit ASNS, four main ones were found: self-promotion and ego-bolstering, acquisition of professional knowledge, belonging to a peer community, and interaction with peers (Park, Kee, & Valenzuela, 2009). Escapism, a factor that typifies the gratifications that social networks deliver (Quan-Haase & Young, 2010), proved to be weak if not irrelevant in regard to academic networks.

The four main gratifications that typify the use of academic networks largely reflect the uses and gratifications theory but require some adjustment. The original theory separates emotional factors from personal ones (Katz, Blumler, & Gurevitch, 1974); in ASNS, self-promotion (personal) and ego bolstering (affective) are inseparable. The "social" factor, in contrast, is split in two where academic networks are concerned: belonging to a peer community and interaction with peers are identified as separate factors. They are different in that peer-group affiliation does not necessarily require interaction with others and is manifested in unilateral action by the user. Interaction with others, in contrast, entails user initiative and responsiveness.

The centrality of the self-promotion and ego-bolstering motive stresses the utilitarianism that drives the use of social networks generally and academic networks specifically. The creation of social capital and personal advancement by means of activity on social networks is well known in research on such networks (Ellison, Vitak, Gray, & Lampe, 2014; Valenzuela, Park, & Kee, 2009). From this standpoint, the behaviour of users of ASNS shows that they recognize the network as a mechanism for the creation of social capital and for an attempt to transform it into professional capital. In a world where academic faculty members are judged by the number of works that they publish and the number of citations that the works receive an instrument that allows them to influence the extent of their exposure and increase the likelihood of citation delivers much power and utility.

The high score of the *consumption of professional academic information* gratification stresses the importance that academics see in having direct and open access to academic information as argued by Veletsianos and Kimmons (2011).

The separation between the two social gratifications *The sense of belonging* and *Interaction with professional peers*, and the fact that the sense of *belonging to a community of practice* was ranked higher strengthen Seidman's (2013) notice the social gratification of social networks relates more to the need for a sense of belonging than to the need for interaction.

The fact that interaction in this environment and academics' motivation to engage in it are significantly weaker than the other uses and gratifications could be explained on the ground that the social potential of ASNS has not yet been fully realized by the academics because they are so new.

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NEW METHODS IN THE DIGITAL LEARNING ENVIRONMENT: MICRO CONTENTS AND VISUAL CASE STUDIES

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Introduction

Our research has been based on the new approaches that have emerged over the latest decade to tackle the issues of using ICT applications in education to activate students. Between 2012 and 2015, we implemented several educational projects related to the development of digital learning environments where students of engineering and economics specialized in teaching were surveyed in order to collect information on the special features of the use of digital curricula and in order to increase student activity in the development project. Based on this research, our presentation focuses on an innovation in the field of didactics, tackling issues related to the learning environment (RE-imaging learning environments). This innovation is expected to play an increasing role in the modernization of secondary and tertiary education. The didactic processes related to the terms *Micro-contents* and *Visual Case Studies* may result in obvious advantages in network learning implemented in a digital environment. They may boost the motivation of students, intensify communication between participants and encourage students to participate in the development of educational contents. The application of micro-contents may be increased both in time and space by ICT support. Applying the relevant text mining methods to a sufficiently high number of texts generated by students provided the necessary empirical base for analysing collections or micro-posts from a theoretical point of view. Diversifying the generation of micro-contents in a new ICT environment (broadband, mobile, increasingly memory-independent cloud services) positions educational contents in a new media. Generating interactive image outputs for micro-contents also has potential for a new didactic innovation. This didactic innovation, currently at the experimental stage, may facilitate the recording and evaluation of computer managed texts in a new system (MEdit). This system is able to display micro-collection contents both as conventional documents and in the form of power point-like slides, at the same time.

Learning: Basic Activity

International trends show that learning has become a basic activity where applying state of the art tools and methods to acquire knowledge quickly and efficiently is important both for individuals and organizations. It is increasingly recognized by modern commercial and public benefit organizations and has radically transformed the culture of modern universities.

Teachers play an essential role in these changes and development processes, and universities have a reasonable grasp of the learning technology and the pedagogical aspects of e-learning, and have installed adequate IT systems and provided staff development to change the teaching and learning environment.

We are heading for a "threshold", with the events of previous years pointing towards the development of a complex e-learning policy at universities where the relevant conditions have been continuously improving. The digitalization of learning content and on-line e-learning courses are also obviously successful and easily applied in new projects (technology transfer, non-formal training and vocational training). Sustainability has become an increasingly important issue in maintaining and continuously applying the results of e-learning development, in the digitalization of learning content and in the operation of the relevant framework systems. Universities have to face this challenge, particularly because the problem cannot be tackled efficiently using the current small-scale system, with individual departments and institutions making independent decisions about the question. The conservative approach of universities to new initiatives in the field of educational innovation is rooted mainly in their general attitude. We should note here that "new" institutions of higher education are much more open-minded regarding e-learning systems such as MOOC. Standard university practices include decision making procedures in the case of new experiments or international projects and co-operative initiatives related to e-learning which are fit for purpose and result in innovative solutions.

Recognising this trend, our department regularly organise training programmes for trainers addressing topics such as new (e.g. connective) learning theories, atypical learning, the LLL approach, new results in the field of ICT tools supporting learning and education, online learning, the theory and methods of e-learning and some aspects of its application in practice.

Our project on "E-teaching Culture and Digital Content Development", implemented between 2013 and 2015, aimed at developing content, methodologies and services related to the competitiveness of higher education and the relevant structural changes and at meeting the challenges raised by knowledge-based economies. Matching the specialities of higher education, we developed methodology training programmes for complex subjects to develop the educational competences needed for designing and applying complex curriculum units in teacher training. The basic idea was to provide the basis for a new, medium-term research and development project that would aim at putting the developed methods and procedures into practice, designing and applying new e-learning curricula. The majority of these programmes have been integrated into the regular university curricula; they are continuously applied and updated every semester.

In developing vocational training concepts, a personalised approach is generally applied. Vocational training has a unique position in progressive educational systems, mostly because the duration of training programmes is much shorter than it is in non-vocational programmes. This uniqueness is manifested in the way vocational programmes prepare students for the social division of labour in the broadest sense. In this dynamic process,

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currently existing progressive elements (e.g. the penetration of IT solutions and the general application of biotechnology) and highly probable new developments (e.g. changes in the energy structure) serve as mechanisms to create a modern vocational structure. Interdisciplinary approaches are increasingly acknowledged; however, we should note here that accelerating technical development results in the continuous restructuring of technical culture and educational content. These traditionally focus on information, so strong competition may be foreseen between traditional curricula focusing on quantity and new ones embodying a more complex approach. Educational institutions will only be able to resolve this conflict if they are willing to modernise their knowledge transfer systems, which are traditionally rigid and divided into subjects, and develop the didactics of a new, integrated approach.

The MOOC Effect

An important direction in international educational content and didactics development is the creation of open curricula where those actively participating in learning contribute constructively to the process of development. Another characteristic is mass access to content, supported by efficient modern online platforms. Currently, this approach is most innovatively applied in higher education (MOOC); however, the large number of students in vocational education, as well as their increasing age and the wide variety of their future professions urge the methodological adaptation of these solutions.

In Hungary, public education and vocational training were transformed between 2011 and 2013 and the education of teachers took a new turn. A general expectation regarding teacher education is that qualified teachers should be well prepared and able to cope with the following tasks:

- tasks of public education as defined by the National Curriculum according to development fields and educational objectives; transfer of the values and content of education; knowledge building; development of core competencies and the ability to make use of them;
- providing teaching services in public education institutions in accordance with their professional qualifications, in the phases of formal education defined by the Act on Public Education and in the framework of approved curricula based on the National Curriculum; providing teaching services in non-formal education and adult education; performing educational activities in the workplace;
- creative participation in educational development programmes relying on their knowledge and experiences.

Thus, our research on didactics essentially focused on the differentiated control of the class work done by vocational teachers and the application of efficient educational methods and processes. From the point of view of this research, the general criteria for preparing teachers

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were partly traditional, manifested in knowledge, abilities and attitudes, and partly related to expected teacher competencies, broken down according to the following broad areas:

- knowledge related to didactics and the given subject;
- support, organization and control of learning.

Another specific feature of the activity of vocational teachers is that they are allowed to teach not only at schools but also in non-formal vocational training. Hence, they have to be well prepared to teach age groups well beyond the 14-18 range when providing vocational training for young adults and adults or learners with special needs. Training teachers to teach trade groups or use vocational contents related to particular sectors is hindered by the almost complete lack of textbooks that could support the teaching of professional subjects at vocational secondary schools. Thus, teachers can only rely on the actual course requirements within framework curricula for vocational education and training. This justifies the demand to put content development for specific subjects and thus the development of a new didactics into the focus of educational development, facilitating both the training of vocational teachers and the learning of professions at school.

The World of Micro-contents

Micro-contents cannot be strictly defined according to their size alone, as size may depend on time, location and application or on the relevant agreement within a group of users. The tools used to transfer content also influence size and quality. Conventional postcards, for example, could only convey messages limited in size, representing an early form of micro-contents.

The Short Message Service, still popular today, restricts messages to 160 characters. We might think that this limit was due to technological limitations at the time when the GSM telephone system was being standardised in the 1980s but actually, if the information provided by the press can be trusted, it was rather based on a decision by a single person (http://latimesblogs.latimes.com/technology/2009/05/invented-text-messaging.html). Twitter was originally supposed to be the short message supplier of the Internet, initially allowing 140 characters for a user message. However, Twitter policy has radically changed: messages of unlimited size can now be accompanied even by pictures (https://blog.twitter.com/2015/removing-the-140-character-limit-from-direct-messages). Hence, this representative of micro-contents has ceased to exist.

A message can not only be defined as a micro-content on the basis of the number of written characters it contains. Snapchat allows maximum of 10 seconds for viewing an image or video sent by a user, and you cannot ask for a replay. This means that users must phrase straightforward messages that can be taken in and understood in the given time frame.

At our Department, we had already conducted experiments examining how we could manage and control large numbers of students in creating micro-contents while complying with the methodological rules of editing and developing content. According to the own definition, micro-content is a text, a picture or a media-based information package which carries public

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agreement, and is of screen size (e.g. a text contains c. 1,000-2,000 characters). The *cognitive pressure* put on the reader of the micro-content is not high, which means that the content package can be understood and remembered at first reading.

Micro-content conforms to current media consumption habits, which mean that the available mobile tool constantly swamps the user with a permanent flood of information, and the user's main task is in fact to select the items that are really important for him/her and to coolly ignore the rest. The size and structure of micro-contents are ideal to minimize the feeling of "wasted time": the reader can rapidly decide whether the information package is really necessary for him/her or not.

We created a micro-content managing system named MEdit. In this system students can create any number of micro-contents. These contents are available to readers in a summarizing data flow which thus shows a colourful mixture of the contents uploaded. At the next level, the students can arrange the micro-contents into so-called thematic collections in which, besides their own work, they can also place the knowledge packages made by others.

Figure 1. Examples of image and text based micro-contents in the MEdit system

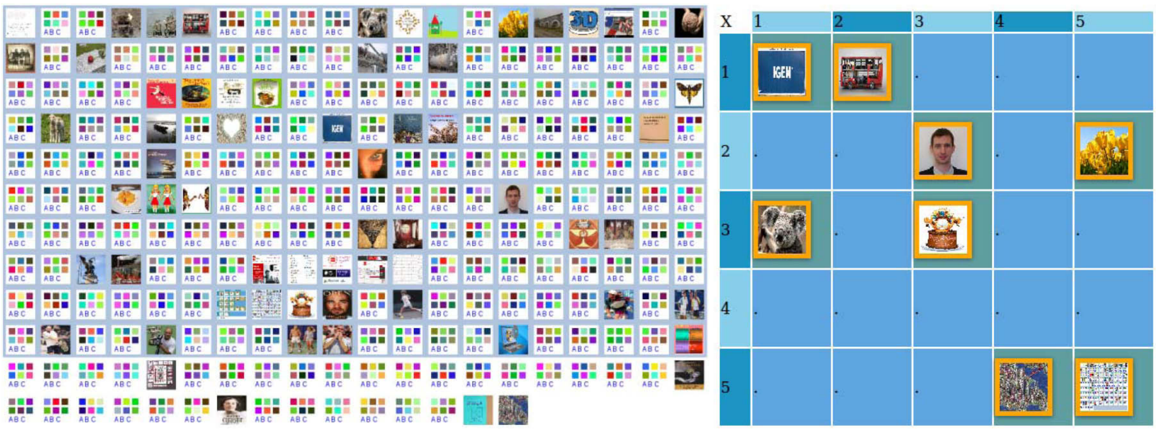

Figure 2. Massive quantities of micro-contents and a thematic collection

Micro-content units may be organised into thematic collections as illustrated in Figure 2. In this case, users may organise their own compact units in a table, using its cells. Compact units may be moved between cells or deleted.

Students who piloted MEdit needed some time to get used to the interface and to learn to appreciate the system. Once the first, well edited micro-content units had been uploaded, the majority followed the good example and started to develop their own compact units and then

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organise them into thematic collections. Most students processed their latest reading experiences, organising the contents of rather long books into 5 to 10 micro-content units, thus enabling others to decide whether a particular book was worth reading or not. Some students prepared collections in their own professional fields, processing contents related to topics such as boilers for domestic heating systems or raw materials for manufacturing wood products. Topics related to recreation and hobbies were also represented (e.g. Hungarian dog breeds, fish species for angling, descriptions of one's home town, etc.). All in all, a very diverse and valuable set of data was generated during the trial period.

Towards Visual Case Studies

Our efforts to include more visual elements in the content of training indicated that creative tasks and the possibility of the complex use of visual elements match the ideas of students about e-learning content. This new curriculum, where verbal and visual elements are presented in a one-to-one ratio, and where knowledge elements are organized into a network, would be scale-independent and structured as a graph. It would also be supported by a mathematical representation to enhance both its theoretical and practical aspects, and users would be allowed to extend it by means of case studies and practical examples.

A new e-learning textbook was created in the autumn semester in 2015 by the curriculum developers (subject: Systems in Vocational Education) with the SysBook platform assisting those who were interested. We asked the students to make *case studies* as micro-contents, with the compulsory inclusion of visual elements. These case studies had to be optimised for a screen (laptop, smartphone, etc.) according to the rules applying to micro-contents, include visual content that described the operation of the system and, if possible, they also had to include a mathematical formula for the same purpose.

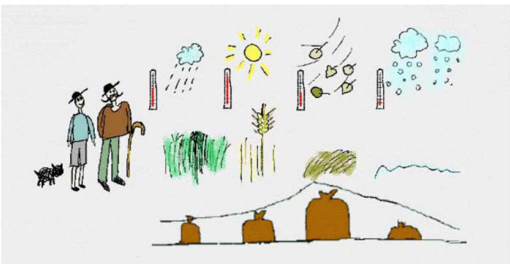

Figure 3. Illustration from SysBook – Probability frequency
(http://sysbook.sztaki.hu/sysbook6.php?page=19&left=intro&right=intro)

The SysBook offers the students a special structure. Each one of the almost 140 sections is customised for digital screens and each one is constructed to represent six levels of interpretation (Comics – Description – Maths – Example – Theoretical – Education). The content is presented in quantified units which the reader can read linearly but, because of the levels of interpretation mentioned above, each unit offers a range of possible ways to become familiar with a particular topic and examine it from various points of view. As a result of its structural features, SysBook takes the middle ground between modern hypertexts and traditional books.

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The post-graduate students completing this task proved to be extremely creative. As an illustration, we have selected the picture explaining free fall, a perfect example of how well such a relatively complex phenomenon can be illustrated, explained and understood in this way.

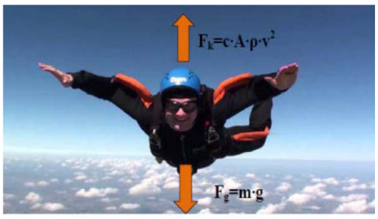

Figure 4. Freefall – Example of student work where a photo is edited with a maths formula to illustrate the effects

Summary

Learning activities are becoming general and permanent – and the necessary tools for this are provided by info-communication technologies (ICT). However, methods that will enable the creation of sufficient educational resources still need to be researched because there might be radical changes in content usage habits. Among the several possible directions, our SysBook project provides a good example of how traditionally text-based learning resources can be enriched with images and complementary information as well as levels of interpretation. The corpus elaborated by experts can expediently be completed by students, making the learning resource more personal. Another trend is represented by the MEdit micro-content managing system, the core of which consists of contents which have been created by extracting the essence, and which are numerous but easy to grasp. The experiences of collective content development, communication and feedback help with the elaboration of micro-contents, while the ways in which they are created and used suit the ways in which the younger generations habitually obtain information. Both methods provided us with useful experience, so in the next phase we will process and share further pieces of traditional learning resources.

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ADAPTED LEARNING ENVIRONMENT IN FUTURE EDUCATION

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In 20 years from now, today's children will meet a world where working environment will certainly be different. The learning environment, pedagogy and technology that will have to prepare them to that world are still unknown. The necessary knowledge, skills and abilities are starting to be clear to educators that will have to form future citizens and skilled manpower.

However, into the 21st century, most schools are still using traditional and outdated teaching methods where the teacher is the main source of knowledge and learning is based on memorization of facts. Most learning environments remind old factories or classrooms taken from Charles Dickens stories.

On the other hand, modern working places are equipped with the latest technology. The work is based on cooperation, collaboration and teamwork. The highly competitive working environments create high level of uncertainty and demand adaptive thinking skills and creativity.

This reality creates a wide gap between the level of educational system graduates and the level of employees that are demanded in today's economy. In other words, most education systems provide incomplete products to the working places, requiring them to invest time and money to improve their training to adapt their skills and abilities.

The 21st century provides information that is available and can be found and learned anytime and anywhere, while skills and abilities cannot be learned only in a classroom. Therefore the role and purpose of schools, learning spaces and teachers has to be changed. The situation as described undoubtedly creates a huge but built in (not to say predictable) gap between the education system and the expectations from the workers within the actual economy and the competitive expectations of the global labour market.

These and other insights led the college think tank to suggest a multi-step model that can be applied not only in innovative learning environments, but also in classical ones and within different and diverse disciplines.

The first pedagogical model was introduced at the end of the 2012 school-year, and was given the name *P2PBE* – Problem to Project Based Education. This eight-step model combines well-known and familiar learning and working processes. The model includes movement on two main axes: the horizontal axis where the student moves from self-work to teamwork and the vertical axis where the student is requested to move within the framework of his learning from individual outcomes to shared outcomes. This model re-defines the role of the teacher and adapts it to the reality of the 21st century.

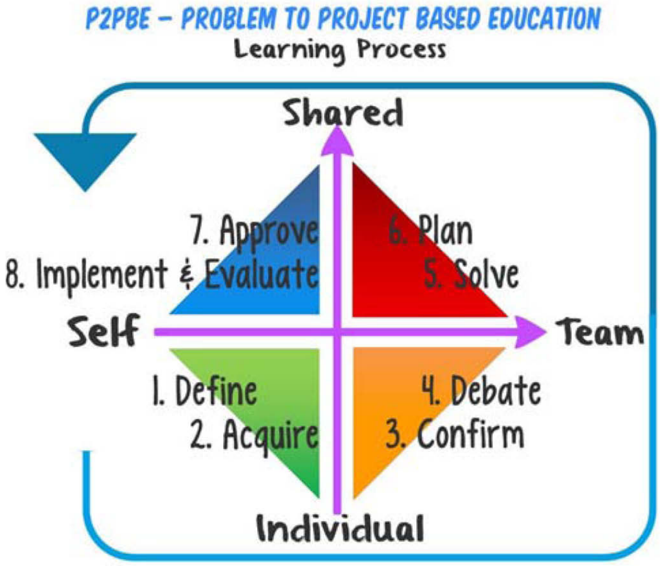

Figure 1. Model of P2BE – Problem to Project Based Education

The described model caused the pedagogical thinking team to examine the classroom space appropriate for the model. The immediate and obvious conclusion is that the classic classroom must change its designation and become a dedicated and dynamic learning space adapted for the different stages of the model. In order to be effective, any learning cannot exist in isolated space and therefore additional spaces are required that allow mobility between the stages of the model.

Adapted Learning Spaces

The implementation of the described dynamic learning model requires a redesign of the learning spaces, which were planned and processed together with Steelcase Education (Grand-Rapids, Michigan, USA). The new spaces provide our teachers the tools to motivate their students through dynamic and engaging learning experience.

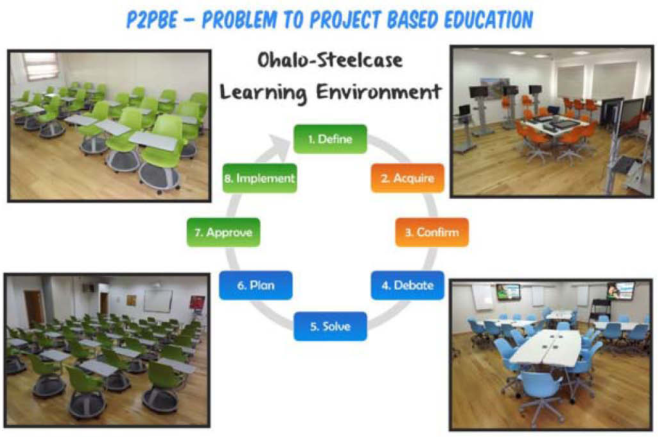

Figure 2.

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At the end of 2014, we developed with Steelcase Education a unique learning space, which was given the working title *the future compound*. In this 350 square-meters complex that includes in a single large space a number of learning spaces, the pedagogical model P2PBE is implemented with all its stages and extensions for ongoing and continuous learning. The complex is virtually divided into areas with varying functionality, where instructors can decide in advance the nature of the activities that they wish to hold in parallel or by cooperation.

Figure 3.

1. Frontal area (1) – for defining the problem, preliminary discussion and presentation of the project.
2. Technological area (2) – for acquiring knowledge in immediate or continuous manner.
3. Discussion area (3) – for rhetoric and discussions, as well as for offering solutions and project planning.
4. Guiding and directing area (4) – for approval and qualification with guidance in small and heterogeneous groups.
5. Imparting areas (5) – for teams whom the instructor is interested to provide enrichment.
6. Quiet region (6) – for a short-term and timed recess for instructors or students, for conducting short meetings or personal conversations with the students.

The space operates in two main scenarios:

- The same course for several groups – In this mode the instructors divide the work between them when each instructor is responsible for a different aspect of learning; technological expertise, leading discussions, leading and training small groups, imparting etc.

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- Various overlapping courses – In this mode the instructors coordinate between them which parts of the lesson or the course are conducted together and which separately, as the outcomes of learning can be common to the students from different grades or disciplines.

Figure 4.

Summary of Findings

Published in 2016, our study (Nissim, Weissblueth, Scott-Webber, & Amar, 2016) investigated the effect of our newly developed innovative technology-supported learning environment on pre-service teachers' motivation and 21st century skills.

Over eighty percent of students and lecturers reported more than a moderate increase in creativity, motivation, ability to get higher grades, and engagement in class while studying in the new learning environment. Students gave statistically significant higher evaluations for practices and solutions in the new classrooms than in traditional classrooms. Significant findings were found in the way students perceived working adequately, or better than adequately, on many of the 21st century skills in the new environment as opposed to the old one.

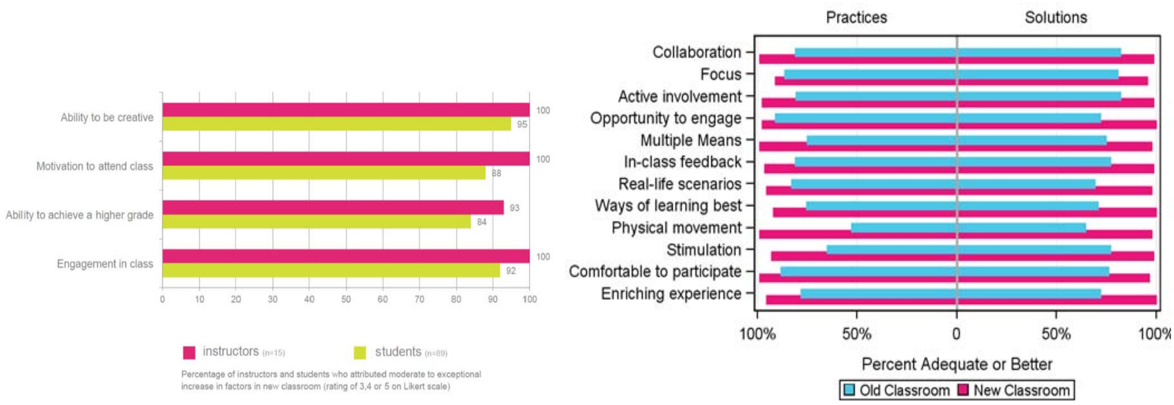

Figure 5.

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Conclusion

The 21st century necessitates the design of a special learning environment that facilitates the acquisition of the skills that the education system would like to develop among its learners as part of their preparation for "real life" in a dynamic, rapidly changing environment full of uncertainty. Throughout the world, educators, educational scholars, philosophers, opinion-makers and laymen have tried to come up with suitable pedagogic solutions for the modern era. Questions such as: how to increase motivation and encourage commitment to learning have occupied the best of minds. We believe the present research to illuminate potential solutions that are supported by empirical research relating to a large proportion of the core issues of innovative education, and that indicate possible directions for the future. Moreover, the significant processes highlighted here are extremely important for the training of future teachers in a changing world. The present research sheds light on the role of learning environments in the preparing and training of future teachers in a changing world. It suggests that student teachers can be better prepared for their future educational tasks when their learning environment fits more to the characteristics of the technologically changing world.

What about sciences? We will know soon…

In the Fall of 2016 we will open the new Biophilic Learning Environment for teacher cadets specializing in science education. This space includes different aspects of nature, such as fish ponds, trees, a greenhouse, an area to grow insects and reptiles, and a stream which runs through it. All this happens inside an ecological, transparent building, which has temperature and humidity control systems. Learners are able to experience the different natural processes in real time and during long periods, instead of just reading about them from a book, or listening to a 60 minute presentation. Technology is applied to measure and monitor natural processes and relationships, and students are able to follow the changes that occur during the four seasons, to measure processes and compare them with those of previous years.

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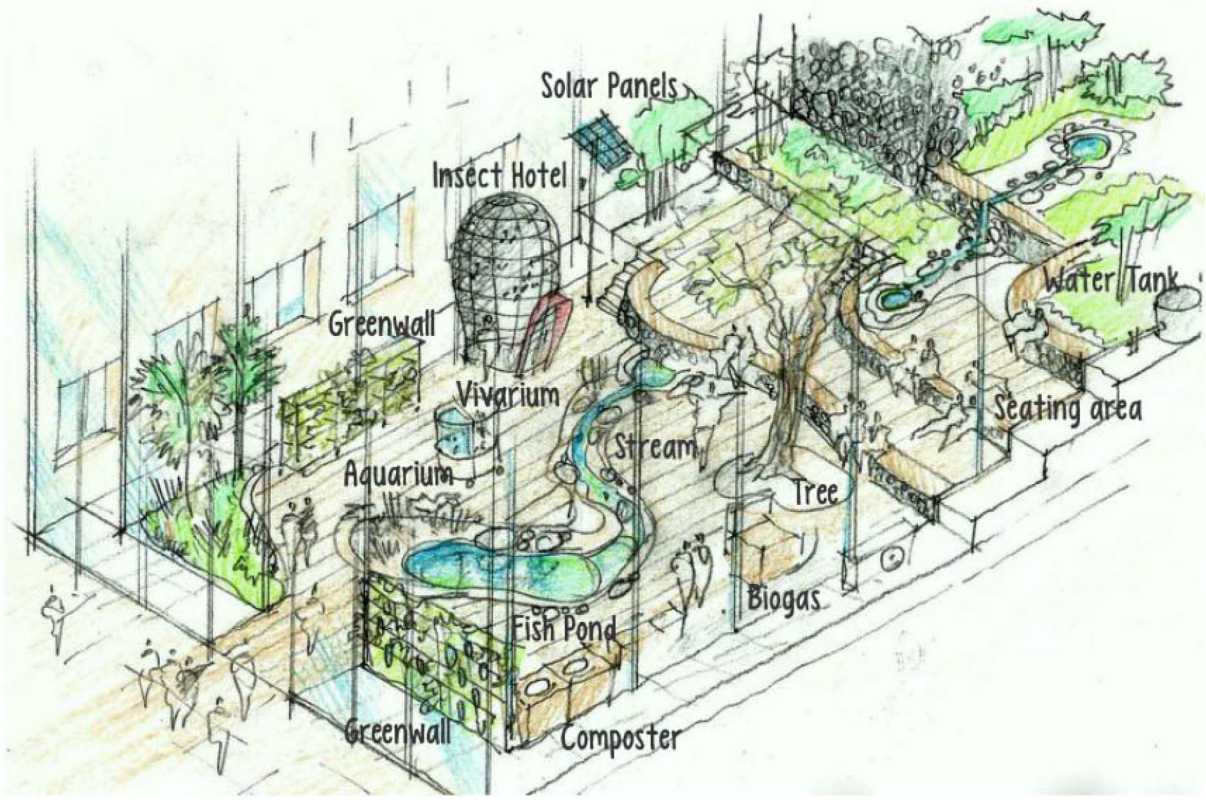

Figure 7.

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TOP-DOWN OR BOTTOM UP: A COMPARATIVE STUDY ON ASSESSMENT STRATEGIES IN THE STUDIO ADAPTIVE LEARNING ENVIRONMENT

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Introduction

Throughout all situations of life education stays as a stable companion. This seems to stay true with new and changing requirements coming with the new technology enhanced society. But as the learning environments are changing, so are the requirements for education. Technology enhanced learning promises a personalised learning experience and support, and translates the real world's instruction into a computerised learning environment. But by doing so it has to answer the same common questions for instructional design: Should education be provided top-down, starting from the general or bottom-up, visiting the specifics first. And additionally – how should this be reflected in supporting technologies of education.

In class room situations, when applying a top-down approach, a teacher will try to give a general overview first, introducing the big picture paired with an overall motivation concerning both content and outcome, showing the correlation between the different aspects of the particular field. In contrast, a bottom-up way of teaching will tackle the details of a specific area first to develop the topic step by step towards the understanding of the whole area. The approaches of top-down and bottom-up education can be translated into trade-off considerations between behaviourism- and constructivism-based learning. But how can these approaches can be built into technology enhanced and enabled learning environments? How can testing – which has to be part of a technology enhanced process of learning – reflect these methods? Bransford, Franks, Vye and Sherwood (Bransford, Franks, Vye, & Sherwood, 1989) summarise in a short manner *wisdom can't be told*, so no test can define what exactly the candidate knows. But the question is not if wisdom can be or can't be told – as experience can be transferred by communication – but if a learner can make use of it.

Technology enhanced learning needs a connection between what has to be learned, what is tested and what is still to be learned based on the results of testing. STUDIO, an integrated technology-enhanced e-learning solution, offers here the right link between testing and learning. It focuses on providing a continuous feedback loop of learning and testing. Within the system a domain-ontology is used for representing the knowledge to learn. Using the domain structure of STUDIO this paper will first introduce two alternative algorithms for technology enhanced assessment – implementing both a top-down and a bottom-up approach for testing. Using the results of a real world online test in the domain of business informatics, new light on the differences of top-down and bottom-up comprehension of learners will be provided. This paper will detail the main findings of this analysis. The survey is conducted in an environment of blended learning, where students learn through different channels.

Behaviourism and Constructivism

As summarised by Ertmer and Newby (1993), behaviourism makes use of the concept of stimulus and response. Learning, following behaviourism, occurs when a learner gives an adequate response to a presented stimulus. E.g. when showing a learner a specific math problem, the problem represents the stimulus, while the fitting answer of the learner is the response. The key question of behaviourism is then how to strengthen and sustain the association between the stimuli and a successful response. Furthermore, the long term goal is to foster positive responses by adding reinforcements to positive responses. Teaching in this framework takes a strong emphasis on preparing and controlling the arrangement of stimuli and the consequences of given responses. Furthermore, the learner is continuously assessed to recognise where to start the instruction and to detect which reinforcement actions are effective for a specific learner. For transferring learned knowledge to new situations, learners are expected to generalise situations, with features shared or similar to previous learned behaviour. The proof of the positive effects of positive and negative reinforcements is going back to the experimental work of Skinner (1974).

Furthermore summarised by Ertmer and Newby (1993), constructivism "is a function of how the individual creates meaning from his or her own experiences". Constructivism envisions the mind as a filter, which filters the world to create its own reality. In this regards the mind is conceived as the source of the derived meaning. The "knower constructs a reality or interprets it, based on his or her perception" (Jonassen, 1991). Following Jonassen, the knowledge is constructed as a result is based on previous experience, the mental structures, and beliefs a person uses to interpret objects and events. E.g. in a class room situation a teacher would introduce the general problem to solve and give the question of method to the learners for reflection and construction of their own methods in favour of connecting to their previous. In contrast to the view of behaviourism, constructivism takes the view that the knowledge of a learner is mind dependent and has to be mapped onto a learner. Learning and the transfer of knowledge always takes place in a context in the view of constructivism and the different contexts offer different links to the knowledge to learn.

Observing the different tendencies of both learning theories, they can be summarised: behaviourism as the top-down, decomposing, fact oriented learning theory which is focused on stimulus/response pairs and constructivism as a bottom-up, generalising, context oriented theory which is focused on linking experiences to new situations. Cognitivism adds here the focus on a more technology oriented theory, focusing on knowledge as symbolic mental constructs within the learner's mind, while learning stores the symbolic representations to the learner's memory.

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The STUDIO Approach for Self-assessment

Both addressed theories of learning come with aspects which cannot be translated or translated only partially into a technology driven solution. At the same time the basic logic of composition vs. decomposition can be compiled into a computerised assessment and follow the learning direction of the respective learning theory. Following the assessment paths of the test, a conclusion on the success of the learning path is possible. STUDIO is a technology enhanced learning environment that captures the relevant domain concepts and their relations by ontological entities around which a set of knowledge assessment and learning management related tasks are carried out (Vas, 2016). The ontology formalises the knowledge structure of the domain of interest by dividing it into knowledge areas and sub-areas.

The focus in STUDIO is on the knowledge assessment method which enables the exploration of test candidates' knowledge gaps in order to help them in complementing their training or educational deficiencies. It is the tutor's responsibility to define which knowledge areas (from the domain ontology) should be included in a given test. Figure 1 shows the result summary visualisation of the testing. Red/dark dots signal knowledge-elements which the learner failed, while green/light dots identify knowledge-elements which are passed. The image visualises efficiently the potential to reason on cleared and not yet cleared areas of the domain. While some concepts are known, other knowledge-elements could not be passed and are marked for further learning.

The choice of a test algorithm for a specific assessment goal has to include an initial analysis on the requirements of the assessment. In cases of a large scale selection of well-prepared learners for the assignment on specific job profiles the strict top-down testing scheme is more suitable and covers more strict the connected organisational process. For pre-filtered groups of candidates, the bottom-up assessment may provide a wider profile of the capabilities of each individual and enable a more profound selection decision.

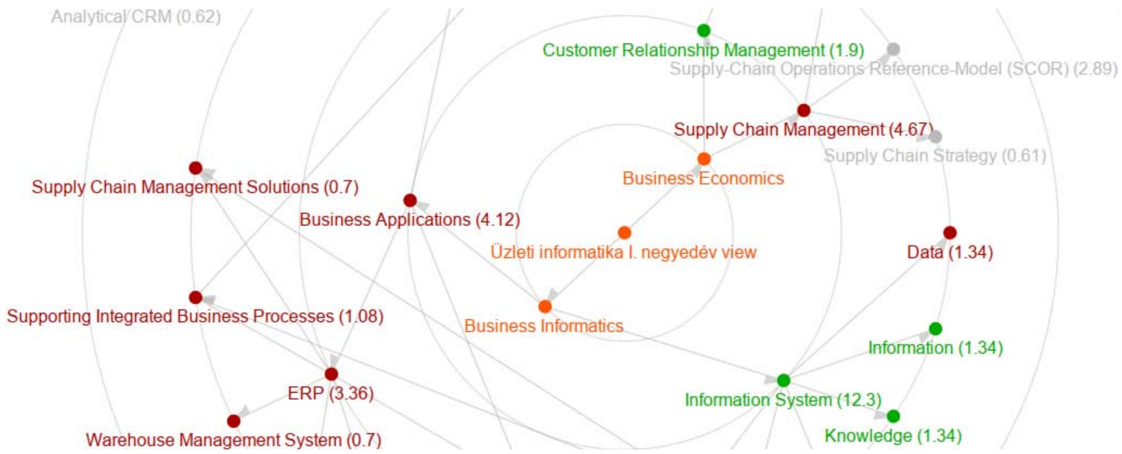

Figure 1. Result visualisation for the business informatics test as an educational feedback to the learner.

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A Top-down Approach on Testing

To offer a top-down assessment, the system follows the assumption, that missing knowledge on an early stage of the knowledge structure hierarchy disables the learner to answer questions for knowledge areas on more detailed levels. Following, the deeper a knowledge-element is placed within the knowledge structure, the more detailed is the concept. This creates an implicit hierarchy from general concepts to specialised concepts while moving down the tree structure. Based on the defined relations, this loading-process provides a tree of the knowledge structure for the test algorithm. An example visualisation, for a business informatics domain, is shown in Figure 1.

Following the tree shaped knowledge structure the top-down assessment triggers a set of steps to assess the represented knowledge: (a) Beginning with the start-element, the test algorithm activates the child knowledge-areas of the start element. (b) The top-down algorithm then selects the first child-knowledge area and extracts a random question out of the test item repository connected to the given knowledge-element and assesses the test taker's answer. (c) When the test taker incorrectly answers the question, the algorithm marks the related knowledge element as failed – else it is marked as passed. (d) The system then selects the next non-failed knowledge area, accessible directly or through passed nodes from the start-element, promotes it as a parent node and selects a random question related to it to repeat the process.

The system dives down the knowledge structure and continuously triggers more questions depending on the learner's answers. In this regards the STUDIO system adapts the test on the fly to the performance of the test taker. Answers provided by the candidate trigger whether to follow or not to follow more knowledge elements on the same branch of the knowledge tree. This process of mapping the candidates performance to the conceptualisation of the domain ontology, resembles the concept of overlay based student modelling (Chrysafiadi & Virvou, 2013). While the learner continues to use the self-assessment through phases of testing and learning, he or she will dive down further into the knowledge structure and explore more detailed areas of the target education.

One limitation of the above described testing method is that the test may stop at an early stage, (e.g. in an extreme case, if there is only one knowledge area at the top level and the test candidate fails to answer the related question correctly, the test stops and no more questions are presented) which may discourage the test candidate on the one hand while also preventing an insightful exploration of the knowledge structure. For that very reason another knowledge evaluation method has also been implemented in STUDIO that follows a bottom-up approach in contrast with the top-down approach of the above described method.

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Bottom-up: A Path Based Approach on Testing

In a bottom-up assessment, in contrast to the top-down testing, described earlier, the assumption is that learners will know details about the represented domain, even if they cannot answer questions for high level concepts. Phrasing questions for high level knowledge elements can be considerably harder to phrase as they have to take into consideration concept dependencies, the numbers of concepts needed to make a statement about the core of a concept and its implications. As such the probability for flawed or biased questions on top levels is higher than for detailed concepts. It has rational, especially in early learning cycles, to start to assess more detailed knowledge first to create an understanding of the current skill level, rather than stopping the assessment on high level concepts which are hard to decompose to be able to provide feedback for the learner. A learner may not have the overall knowledge of an educational area but it can be vital to know whether he/she has the proficiency on the prerequisite knowledge areas.

A solution that can explore the knowledge of learners in a detailed manner, while still avoiding too long testing, is the creation and application of assessment paths. Assessment paths describe routes through the knowledge structure which connects a given knowledge element to the respective start-element (aka top knowledge element in the given ontology). A path can thereby include an unlimited amount of intermediate knowledge elements which are needed to connect to the start-element. To prevent loops in the directed graph, the final algorithm makes use of black-lists of visited nodes, combined with a backtracking algorithm to continue to create and explore alternative paths.

To enable the new path concept, the assumptions about the structure, based on the top-down algorithm, have to be modified and extended. If a test-taker fails on more detailed concepts the system will assume that he or she will also fail on more general concepts. In the top-down approach, as the algorithm starts from the start-element, each passed element in an assessment is connected with a set of passed elements to the start-element. As the bottom-up algorithm starts from bottom knowledge-elements, a path from a passed element to the start-node may include failed elements too. To cope with this situation testing and evaluation are split for the bottom-up assessment, as reflected in more detail in (Weber, 2016). Following, passed elements will be only accepted if they are connected to a path of other passed elements, connecting without interruption to the start-element.

Analysing top-down and bottom-up testing within a course on business informatics

To evaluate the implications of a top-down or bottom-up approach to testing and learning, a study was conducted in a BSc course on business informatics. The students had access both to traditional learning materials and to testing and learning objects, provided through STUDIO. An additional incentive for students has been provided in the form of extra points for the final grade. The study had two stages: students used the system with a top-down implementation throughout 14 days to get prepared for the mid-term exam and with a bottom-up approach

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throughout 13 days, a month later, to get prepared for their final exam. 287 students took part in the top-down test (61,897 tested knowledge elements) and 213 in the bottom-up test (25,919 tested knowledge elements).

Figure 2 describes how many times each knowledge element had been tested using the two approaches (the larger and darker the circle, the more times the element had been tested), while Figure 3 accounts for the number of times a knowledge element was passed across all test runs. The graph visualisation of the visited and passed knowledge elements in Figure 2 and Figure 3 traces the exploration of the two different algorithms. For the top down, elements are visited more frequently when they are near to the start elements in the centre, the focus on the right part tributes partially to the clockwise selection of initial nodes. In case of the bottom-up testing, bottom elements are visited more frequently and more equally, which partially goes back to a stronger random selection component. The sets of points within the graph are scaled within the respective testing algorithms, so Figure 2 (a/b, scale [60,3300]) and Figure 3 (a/b, scale [10,900]). The overall pass/fail distribution among knowledge elements is 73.18% / 26.82% for top-down and 69.87% / 30.13% for bottom-up testing and in this regards comparable.

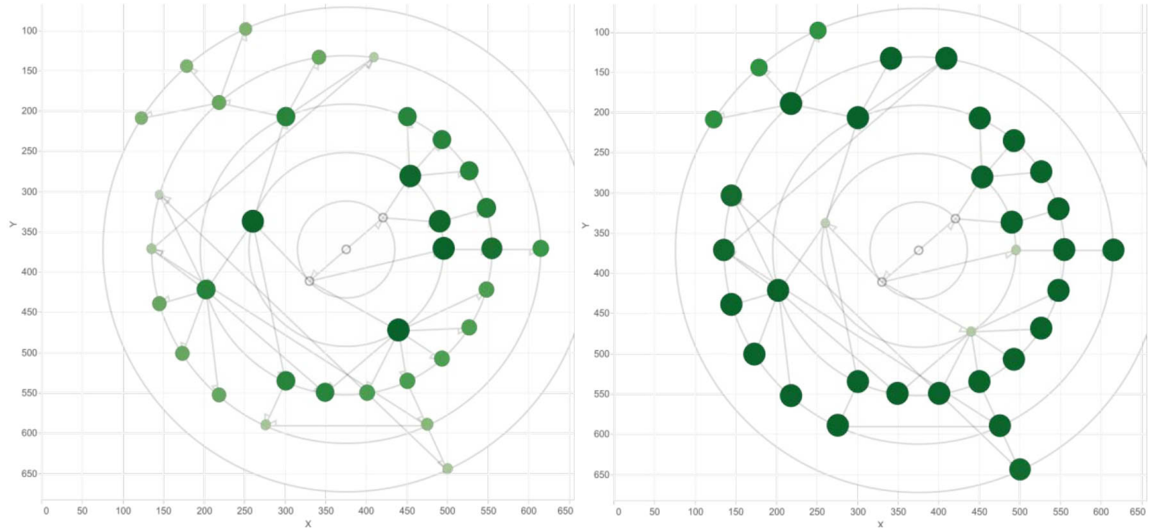

Figure 2. Aggregation of how frequent a knowledge area was visited for top-down (a/left) and bottom-up (b/right) testing visualised on the course's knowledge structure (see Figure 1). Each graph is scaled based on its own internal distribution.

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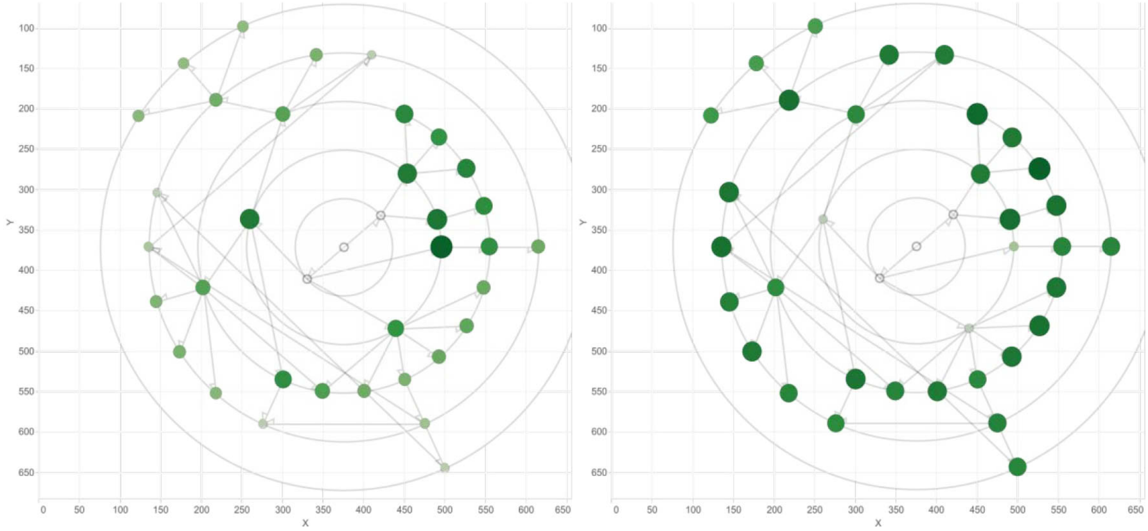

Figure 3. Aggregation of how frequent a knowledge area was answered correctly for top-down (a/left) and bottom-up (b/right) testing. Each graph is scaled based on its own internal distribution of passed elements.

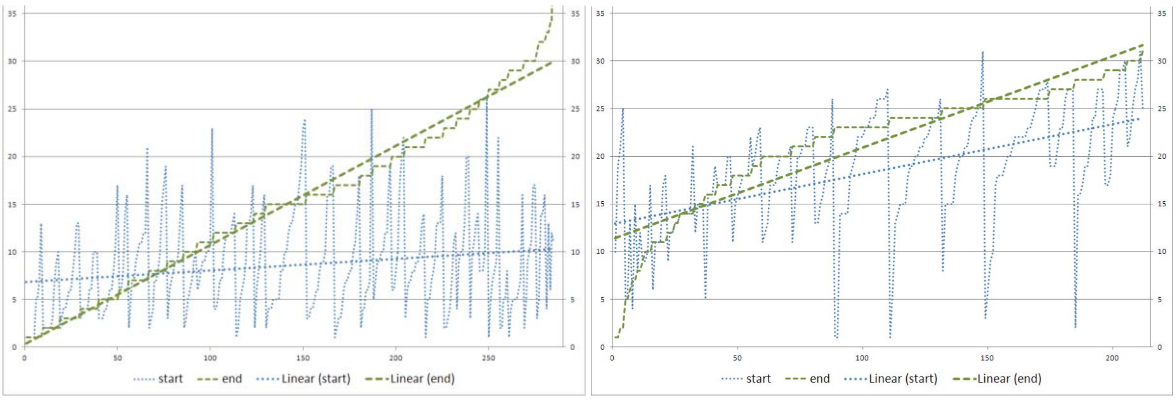

Figure 4. Amount of knowledge elements passed in the first and last test of a user within the top-down (a/left) and the bottom-up (b/right) approach, sorted by the frequency of knowledge elements within the last test.

For Figure 4 only the first and the last test for each student were taken into account to trace an overall trend across tests. The x-axis shows individual students, sorted by the performance of their last test, where the right part picture higher performing students. What is visible here is that the top down test in Figure 4 (a) has a low and flat trend for the rate of passed nodes across first tests. In a direct comparison to the bottom-up testing the top-down tests show in average a higher performance boost for the final test but the bottom-up test starts with a higher average pass-rate and rises lighter and more stable across all users, with a similar std-deviation of 6.16 for the start and 6.34 for the final number of passed nodes, against 5.21 and 8.70 for the top-down approach. The average of the std-deviations of all tests for each user is 4.97 for top-down and 2.79 for bottom-up testing. So within the top-down testing the performance of passed nodes changes in average stronger than within the bottom-up testing. This observation is especially of interest as the higher number of observations within the top-down testing (more observations) should smooth the variation of test results.

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Conclusion

This paper introduced both, a top-down and bottom-up implementation of an educational test based on a knowledge structure and investigated how different the outcomes of the specific approaches are. For the top-down/bottom-up testing, the overall pass/fail level, taking into consideration every answer regarding each knowledge element, is on a comparable level. Yet the average improvement in the test takers' performance is different, starting on different performance levels and showing a different gradient towards high results. The top-down approach seems to encourage higher results from high performing testers on the costs of more lower performing testers, while the bottom-up approach tends to stronger equalise the performance.

As technology enhanced solutions for learning and testing have additionally an initial phase of familiarisation of the tester, an extended test on a more extensive curriculum with more observations may reveal a stronger trend. Further it is likely that the influence of the different stopping-criteria for both algorithms is influencing the pass rates within test runs and creates special "early"-finished test runs which may account for the comparable high std-deviation across all testing algorithms. As a summary the first results are insightful and initiate a later deeper analysis of the specific testing strategies of both algorithms. Future analysis on more extensive knowledge structures will here reveal further insights and help to better distinguish the core performance of testers from further influencing factors as unequally distributed question-difficulties, system familiarisation and stop-criteria.

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IF LEARNING TO CODE IS NOT ABOUT CODING, THEN WHAT IT IS ABOUT?

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To code or not to be…

The need for programming professionals is still growing. The European Commission estimates there are 700,000 unfilled vacancies for IT practitioners, of which programmers outnumber other IT professionals by 5 to 1. In the Netherlands development jobs account for 51.6% of all IT jobs.

The limited response from the different European education systems is worrisome, although there are signs that awareness is on the rise. Estonia has introduced programming across the curriculum in 2012, Denmark is following suit. So are the UK, Finland and Ireland. In Germany some regions are more on the forefront than others. It should be noted that schools are not the only answer to this challenge – so are for example after-school coding clubs as well as initiatives from the IT industry itself – but they are, obviously, a key stakeholder.

Introducing coding in the curriculum at an early age is a long term investment in bridging the skills gap between the technology demands of the labour market and the availability of people to fill them. The key seems to be moving from mere literacy to active control.

One of the problems all are encountering is the shortage of not only generally ICT literate teachers but programming savvy teachers.

At the same time, the art – or skill – of programming is changing rapidly as languages are evolving and, perhaps even more important, interfaces and environments are becoming more intuitive, away from a write-run-test-edit cycle and towards interactive programming environments assisting the developer while writing code, and not just after writing it. This lowers the threshold for meaningful output substantially without raising the frustration of learners to a level where they are prone to abandoning the project at hand. Even in robotics, a few days of initiation allow students to deliver stunning results. Programming moves towards writing a logical map of the desired functionality.

These changes make programming increasingly accessible to end users. Perhaps not, as the IT industry might require, as seasoned developers capable of e.g. Sophisticated parallel programming but definitely in the sense of high level users capable of designing smart apps handling their own needs for collection and presentation level transfer of information customization and personalization of all the devices they are using (PC, laptop and smartphone and soon extending into an internet of things, wearables and more.)

Also important is a trend towards interactive programming environments dealing with a specific context: business related, science oriented, creative manipulation and more. This development facilitates the inclusion of coding in curriculums designed for very different learner profiles.

Metacognition

Computer programming requires higher order thinking skills, including metacognitive abilities. Many seem to expect that including programming at an early age in the curriculum will improve metacognitive skills. This is important as research observes at the level of university students a lack of such skills in first year programming students.

Blakey and Spence (1990) identify the following basic metacognitve strategies:

- Connecting new information to former knowledge;
- Selecting thinking strategies deliberately; and
- Planning, monitoring and evaluating thinking processes.

Chetty and van der Weshuizen (2014) built on this framework and on work by Jenkins (2001) on expressing feelings and emotions in a classroom to establish a metacognitive learning environment, including small groups, an appropriate classroom arrangement and an atmosphere of openness, discussion and relaxation.

A metacognition strategy card was designed to assist learners in developing and selecting a strategy while programming. Reflexive questionnaires, focusing on weekly results, were added. A plan-of-action sheet assists in planning and monitoring.

But as Chetty and van der Weshuizen (2014) indicate, "merely providing learners with a set of metacognition strategies may be insufficient. Guiding them on how to approach and utilize such strategies may be required."

TACCLE 3

TACCLE 3 (following TACCLE which focussed on developing teacher's competences in developing digital content and TACCLE 2 which focussed on learners using programs and apps to create their own content) is an EU funded strategic partnership (2015-2017) for school education focussing on introducing coding in schools in light of a competitive strategy after 2020. In order to do so, the partnership identified the following needs

- Professionalization and upskilling of teachers ;
- Enhanced digital literacy for teachers and learners; and
- A positive mindset of young children towards coding and STEM.

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From a critical perspective and in light of the previous sections, we would like to make the following comments.

Metacognitive strategies must be an integral part of such a project. The pre-service ad in-service professionalization of teachers should therefore not only include the use and mastery of coding environment but also insights in metacognitive strategies and tools to teach them. Learning how to guide students in the use of metacognitive strategies may be essential.

The link with STEM may be less crucial than one might expect. As mentioned earlier, the development of interactive coding environment catering to a specific segment (business, science, arts…) may open up opportunities for coding in very different domains, without necessarily requiring an interest in STEM. While the need for more students to become interested in STEM is need in its own right, strongly connecting that need to coding might not only scare away learners without that explicit interest in STEM but might also hinder the pervasive inclusion of coding skills in a broad array of domains. A STEM mindset can be developed and integrated with programming skills, but that is by no means a requirement or a desired outcome. The reach of ICT is much broader than STEM alone and a background in STEM is no longer a requirement for successful coding.

Conclusion

Introducing coding in the curriculum is really not about coding itself. It is, rather, about introducing a culture of algorithmic thinking, breaking down more complex actions into a sequence of instructions. This computational thinking is itself based on a set of metacognitive strategies in a wide array of domains, applicable beyond coding.

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GAMIFICATION FOR ONLINE COURSES TO IMPROVE INQUIRY METHODOLOGY

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Challenges of inquiry learning

One of the biggest issues in courses and learning materials is that they are usually too inductive, too explicative and entirely too transmissive. In order to ensure that students grasp a concept, learning materials tend to use a single logic path from simplicity to complexity that shows, presents or explains things from only one point of view. Usually truths are presented as established dogma, which doesn't do much to encourage deductive and investigative thinking on the students' part, neither helps students understand that science is made using models built on data and presuppositions.

Investigative learning demands several competences essential if we are to overcome this reductive approach and create more critical and engaged citizens.

According to Barrell (2007) there are different types of investigative learning, depending on how problems are presented or elaborated. In a problem-based learning approach, there are situations in which problems are proposed by the teacher and the learning process traces a limited movement of investigating and solving problems, which can be more or less open according to the teacher's proposal. There are also approaches that are actually investigative, in which problems arise from students' observation of their contexts and/or social questions considered relevant; in such cases, the teacher may provoke the emergence of the problems, but the entire group will share impressions and create shared and collective questions to engage with.

According to Okada (2016), to pursue a safe and socially sustainable world it is important to reshape how we teach sciences, considering an approach that favours innovation and social responsibility.

> *"This process should be inclusive, interactive, anticipatory and transparent. To better align the innovation outcomes it must be based on the societal needs, expectations and ethical values (…) Inquiry based science education is considered the basis for helping learners develop scientific skills, responsible values and lifelong learning. Inquiry based learning is a constructivist approach, which supports students in active experimentation (…) The five E's*

> *is one example, which fosters inquiry based learning through five steps: engage, explore, explain, extend and evaluate" (Okada, 2016; p.12)*

But how can we create courses and digital learning material that promote learning with a more investigative methodology? How can gamification favour this more deductive logic?

Experimentation, Instruction and Creation

When we think of games or even learning resources, we usually think of Closed Instructional Design, in which every action and student feedback are pre-programmed, their paths and trails are determined beforehand, are often even reactive, and feature reductive and limited answers.

But it is possible to go beyond the use of closed and pre-programmed games; they can be departure points to other, more authorial and reflexive activities, or gaming language can be incorporated to pedagogical strategies as a form of gamification, which is the use of gaming elements in other contexts.

But how does that investigative construction happen? Which gaming elements can be incorporated to online courses so as to potentialise scientific investigation?

Pappert (1997) proposes three ways in which we relate to knowledge: experimentation, instruction and creation. Experimentation is the first way to learn; it's what we do as babies, when we begin to explore the world with our bodies and our senses. At that stage we decide what to learn and how to learn it, depending on our bodily reach and on the limitations of our senses. We must consider that experimentation learning won't give us quick access to all the knowledge and cultural practices accumulated by humanity over the centuries.

To accomplish cultural transmission, learning must go beyond personal experimentation and for that purpose formal learning institutions were created, as well as non-formal cultural spaces, both with instructional models that select what is culturally relevant and must therefore be taught. This is what Papert terms the Instruction stage, and it has a planned design. In online learning, the planning process is usually entrusted to Instructional Designers.

The biggest issue with instruction stage, according to Papert, is that we stop learning and accept being taught, since the choice of what will be presented is external to the individual doing the learning. These dynamics foster passivity in students, as they get used to being in a receiving role and develop a content-consumer attitude, rather than the active attitude required for Papert's third learning stage, the creation of knowledge.

The creation stage is when we appropriate aesthetic and scientific knowledge constructions and start to build new concepts and technologies to solve personal and social problems.

The three stages are important, and any course or exposition has an instructional basis, since there is a plan of what will be taught or a script to follow. Also, it would be impossible to

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create anything without access to thousands of years worth of cultural capital. But how can we ditch the transmissive paradigm and improve instruction stage to make it less castrating and creativity-inhibiting? Papert suggests that we use technology to make instruction an extension of experimentation. In other words, that we plan learning materials and instructional processes in which students can experience, experiment and decide their paths, rather than just be receptacles.

It is in light of Papert's ideas that we stress the importance of creating learning materials that enable experimentation rather than demonstration. Games and gamification can be very relevant to this transformation, because games are usually experimentative and players have high agency and are in a position to make decisions.

According to Murray (2003) games, as digital media, have three aesthetic components: agency, immersion and transformation. Instead of addressing transformation we prefer to highlight the fun aspect, because it is usually the fun things that transform us. Therefore, we shall consider as fundamental gamification elements agency, immersion and fun.

Agency, Immersion and fun

According to Murray (2003; p.127), agency is "the gratifying ability to make significative actions and see the results of our actions and choices". Murray claims that the interactor can assume the roles of navigator, protagonist, explorer or builder.

Agency is related to the action that the player will make, and consequently to gameability, which is the part of game design that regulates interaction between users and games, meaning that it defines what users will effectively be able to do in the game and what are the feedbacks and rewards.

Gameability includes the matters of competition and collaboration, since those relate to how the player or players will interact with the game and with each other.

Gameability also has to do with the missions and challenges. What sort of challenges are there? What is the sequence? Is there a hierarchy, or are they independent? Are they open or closed?

If the game has educational purposes, it can be of interest to design agency and gameability keeping in mind the competences you want the student/player to develop. This relationship between agency and competences is an important clue to produce good Gamified Instructional Design for a course or learning material.

The greatest challenge often is the lack of cohesion between the expected competences and what the player actually does in the game. There are many reactive and reductionist games that accomplish nothing beyond the memorisation of concepts and don't develop complex competences such as the ones needed for investigative learning. Reactive actions are quite useless in learning to analyse contexts or to problematise, for instance.

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Another important element is immersion, which is the famous "magic circle" that makes a player stay in a game, often for hours. Much more than sensory stimuli or devices that isolate the player from the physical world, immersion is a complex concept that involves more than sensation and thinking (sensorial and cognitive structures), comprehending also feelings and intuition.

Immersion can also be brought on by feelings of belonging and by archetypical structures, such as the ones invoked by narratives. The simple use of virtual environments or technology that intensely stimulates the senses is not enough to ensure immersion. A novel can be more immersive (and even more interactive) than some games. The secret is usually in the narrative, packed with symbols so as to attain subconscious – and therefore deeper – contents. There are several levels of immersion, ranging from a simple visit to the full-on transport of the embodied mind to that magic circle.

In a research on immersive educational practices, Carolei (2012) proposed the following relationship between immersion and the concepts of Jung (2004) and Delors (1999):

Table 1: Immersion dimensions

Immersion dimensions	Psychological Typology (Jung)	Proposal for Contemporary Education (Delors)
Physical	Sensation	Learning to do
Empathic	Feeling	Learning to live together
Cognitive	Thinking	Learning to know
Experiential	Intuition	Learning to be

Carolei (2012) conducted a research with online students analysing the connections between their psychological typologies, instructional activities and the functions they demanded. Data showed that immersion is deeper when more Jungian psychological functions are demanded and more of Delors' proposals are attained. Therefore, an activity is more immersive if it invites on one to do, to know, to live together and to reflect about oneself.

The study's main conclusion is that if an experience remains at the sensorial level it is less immersive than the ones with symbolic content that involve the Intuitive function, or emotions that engage the Feeling function, or even experiences with complex investigative proposals that demand the competence to know, especially those experienced in investigative processes.

Another important conclusion from Carolei's research (2012) involves the results achieved by playing on students' lesser psychological functions. According to Jung, every person has a lesser psychological function that is less used. When the activity demands that function exclusively, students tend to initially refuse to do the activity, abandon it at the start and report that they didn't feel immersed. But once they overcome that initial rejection and persist, the experience is more transformative than the ones in activities that demand the functions students are more comfortable using.

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This information is very relevant for online courses and for the new trends of personalised learning, since if we adapt the materials to match what's more comfortable for each student we might be losing the chance to enlarge their experience and challenge them to develop other psychological functions.

When it comes to educational proposals, especially regarding scientific literacy, immersion via the Thinking function with an investigative format is very desirable.
However, we must be careful of the two sides of the Thinking function: the magic immersion circle can be shattered if the activity is too explicative, but if it's mysterious and deductive, the activity can have a high immersive potential. The difference between knowing in a more or less immersive fashion lies mainly in the activity's logic.

Often used in demonstrations to highlight more direct relations and general rules, inductive logic is not very immersive. That is clearly visible in some educational games in which the narrative or action context is interrupted for the explanation of concepts, formulae or rules. That's a nuisance for players, because it breaks the charm.

Description and abstracting processes are part of knowledge, but often they need to be made "palpable" by imagination.

Deductive logic has an inverse process: as in a detective story, one must identify the rules in context through evidences and clues. One makes connections, and that eases projecting, mental building and imagination. The descriptive and inductive process presents students with the relationships as given, whereas the deductive process attempts to use clues to establish, find and/or imagine relations and often create new mental schemes and models.

Many educational games are boring because they are too inductive. Is it possible to change the logic? Instead of providing information and proposing very simple relations, it would be more interesting to propose clues and give students the opportunity to investigate, imagine, build hypothesis and make lots of mistakes.

The deductive process is less certain when it comes to transmitting information, which is the biggest fear of those who want to control student interactions, but the trade-off is the development of exploratory and contemplative competences.

The cognitive imbalance caused by problematization can also be very immersive. There are people who love challenges and problem-solving.

However, some problematizations are more contextualised than others. When a problematization is part of the narrative or of gameability it is more immersive than when it's something artificial or abstract.

Another interesting immersion element is Intuition. Immersion via Intuition can attain high symbolic levels. In order to achieve that, we must go beyond representation (signs) and into that which significantly moves us (symbols), that which transforms us and cannot be fully

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explained. The symbolic movements touch on archetypical structures and in doing so move the players intensely, even though they rarely have a clear understanding of why that happens.

In order to broaden awareness, it is important to acknowledge that game production can be influenced by image regimens.

Myths, tales and other narrative forms move us because they touch on subconscious symbolic regimens. The hero, wizard or storyteller are part of us and of our way of interacting with the world, and consequently with information and learning.

One way to experience intuitive immersion, to represent those "internal aspects", is to make use of dramatization. That's why RPG (Role Playing Games) are so interesting from a learning standpoint.

A RPG situation always has rules, but when the proposal is open to interaction and intuition it is possible to experience different ways of dealing with those rules, proposing new paths and resolutions in a rule-breaking attitude. Laurel (1993) proposes theatre, or dramatization, as a promising activity to conceive or design interactivity relationships, because in theatre one learns to work with multiple agents, to observe and reproduce, trying to recreate human behaviour models.

Theatre as well as games need rules and roles. There are "mechanical" models involved, since one of the essential steps in learning how to interpret is to acknowledge one's own mechanisms, bodily automations and how they inscribe history and sensation in the bodies, so that later one can consciously manipulate those sensations. In games there is always programming and procedure, and our process is to create despite such programming.

That sort of interaction situation can be used for learning purposes. Dramatized situations can work as an experience laboratory, reproducing certain behaviour environments and helping face the conflicts that emerge in those environments. Those settings allow for investigative learning, with the elaboration of hypothesis that are tested on the dramatized situations.

One way to do that is to build awareness of those mechanisms by experience and experimenting. In today's world, with technology that enables us to create universes and powerful illusory situations, it's possible to increase both alienation and the levels of experimentation.

That is why being aware of the reasons we made choices in a game, of our trajectories, of the paths we experienced is very revealing of how we think and learn. Cartography is essential to all processes.

Schlemmer and Lopes (2016) stress the importance of the cartographic method to make sense of the gamification experience and highlight some limits, such as the design of phases, which may not afford the gaming experience the open and rhizomatic nature it requires to be more transformative. "Gamificação em espaços de convivência híbridos e multimodais: uma

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experiência no ensino superior, financiada pela CAPES, CNPq e FAPERG." This results are directly related with analyses of academic activities about cognition in digital games with students in the graduate course Technology of Digital Games-Unisinos.

> *"The stage design of a game can not always guarantee this opening, because it is a limited context and whose control does not develop fully in the reconfiguration of the field of knowledge of the learner. The possible reconfigurations occur in circular or linear dimension of its own success by completing missions. Accordingly, a goal post priori always appears limited from the viewpoint of mapping, but not limiting the viewpoint of learning. What is learned opens possibilities but, on the dynamics of the game, not necessarily unpredictable, since it is provided to advance phase. In this case, it seems important to consider that you need to invest in game dynamics to strengthen and enhance the narratives of the players (as in the case of the RPGs)" (Schlemmer & Lopes, 2016; p.202)*

Those limits can often be overcome by narrative logic and imagination. When one describes processes, one reflects deeply about their choices, affections, and the impact is more powerful and transformative than performing tasks with pre-defined goals. Process descriptions as a narrative can be more powerful evidence than results, scores and other indicators obtained by reductive and reactive answers without any metacognition or reflexion involved.

We always expect a game to be fun. The Latin version of the word "fun", besides being associated with difference, has in its etymology "a second version". In other words, it's as though we tried to experience another reality, another time, another place, another life. To evade our daily routines and allow ourselves to be something else, live another life, in different places. That's the powerful magic of games: allowing for other versions, including other explanations of reality itself.

Realist games with detailed simulations are frequently more successful in demographics for whom the portrayed reality is very far from what they experience every day.

Games with fantastical plots delight a great many people (we have only to look at the success of characters such as Harry Potter), even though many adults have a certain resistance to that sort of plot, feeling that fantastical elements infantilise games.

The biggest challenge in the use of games with fantastical plots, besides students' possible resistance, is discussing the process. In more fantastical games people project more and reveal more than would be expected, or politically correct. Sometimes issues arise, every bit as interesting as they are complicated. But that open aspect is highly transformative.

A common problem in games with fictitious and fantastical plots is that metaphors and characters aren't designed properly. The symbolic elements are often poor, for lack of game design knowledge.

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Symbolic elements are very powerful and must be well-chosen to be effective. We must go beyond entertaining – which can dissolve into alienation. In an educational context, we must do more than just distract the students so that they don't realise they're learning; we must make learning more fun by offering different options, challenges, investigation rather than having the student simply consume information or be amused.

There is no learning if we keep to the politically correct, with everything under control, following instructions and with a guaranteed result. It is better to offer experiences and diversity so that students can make mistakes, try again, propose new paths, live many lives and, in doing so, create.

Fun doesn't lie in evading and denying the world we live in, but rather in experimenting new ways of learning how to better deal with this world.

Immersion is related to fun as well as agency, since the player's action isn't a mere command but "an experience to be savoured" and that causes an "affect" on the player.

As we said before, agency can happen through navigation, which allows the player to face the "unknown" as a labyrinth that must at once provoke and control the user's trepidation. Educational proposals as well as their narrative lines can be plainly delimitated, but there must be room for the navigator to create their own stories and project themselves in the game.

There are many possible solutions in a labyrinth. There can also be games with rhizomatic structures and no solution; in that case, the user must act as a detective: experiment hypothesis and create their own answers in more open and pervasive games without pre-programmed conclusions.

Final considerations: linking gamification to inquiry methodology

As we have seen, there are several important competences to be developed for a more investigative attitude. Gamification of online courses can help enhance many of them:

- Observation: Gamification can propose narratives, work with characters, exploratory actions, including of physical environments using augmented reality, media locative or many sorts of log that can help the online student be more observant of his/her own territory, question and problematise his/her own actions and experiences;
- Questioning: the sorts of challenges proposed and even actions in which students have to prepare challenges themselves, with clues for the other students – that always helps with proposing good questions;
- Engaging: Most studies on gamification present student engagement as a result, noting that students increase participation and mobilisation. However, that's not something inherent to any gamification effort, but rather dependent on a good challenge, narrative etc.

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- Exploring: Exploring is a deductive action and must be proposed with clues, questioning, course log and pattern-seeking. In a game, usually the player collects items in exploratory actions so in gamefied activities we must think of ways to keep score, logs, possible access to information as "mysteries" or simply the attitude of exploring spaces and sharing records and patterns;
- Explain: in investigative logic, the explaining isn't done by the teacher or the material, but by the person that is learning. The student must have ways of communicating and sharing their experiences, describing and recovering them.
- Evaluate: understanding processes and trajectories is essential for learning. Much more than scores and rankings, gamification is interesting to evaluate our ways of interacting with certain themes, contexts and environments. Badges, markers and interaction data visualisation strategies can be interesting to help chart the process, but it must involve awareness and display something relevant – for instance, a visualisation can be interest if it shows the social impact of an action, but if it's just a number or illustrative icon, it will not aid the evaluation process.

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DEVELOPMENT OF A NEW ACTIVITY-BASED INSTRUCTIONAL DESIGN MODEL

János Ollé, László Hülber, Eszterházy Károly University of Applied Sciences, Knowledge Center for Education Theory, Instructional Design, and Methodology, Henrik Sablik, Ágnes Kocsis, Nexius Learning – ELMS Zrt., Hungary

Introduction, Raising the Problem

The advance in the use of technology in the classroom has led to traditional pedagogical frameworks taking something of a backseat. This is despite the realisation that the benefits to learning and motivation attached to e-learning solutions are not as unequivocal and evident as originally supposed. This is reflected in the findings of the PISA Students, Computers and Learning (OECD, 2015) report which shows that inappropriate ICT methodological solutions may negatively impact on student learning. Effective ICT application is also hindered by the fact that attention is always focused on the latest technologies instead of the issue of digital tool use which is based on evidence and research. This results in new technological tools – at the end of the activities described by the Hype cycle (Gartner, 2015) – being superseded by the appearance of new technologies before there has been the opportunity for the former's implementation and effective application. In the rare cases that good practice occurs and successful e-learning solutions are implemented, it can be observed that the scientific elaboration of methodological parts is treated with equal importance through the use of the latest technology.

With the widespread adoption of e-learning, the necessity for more research into its effectiveness and quality, and into the operation of an efficient market, has arisen. In order to improve quality and assess impact, it is paramount that methodological approaches are revised and to utilise the findings of previous research on theories of education, instructional design and the psychology of education.

In the case of e-learning curriculums, instructional design is often reduced to the use of multimedia documents, animations and other pseudo-useful, pseudo-interactive and, quite often, self-serving content. However, instructional design is concerned with the structuring and logical ordering of content, on conscious planning and on the visual phrasing of activities connected to content and learning tasks. At the same time it can be used to assess current levels of knowledge, is designed with an awareness of the educational purpose in mind, while all the time matching and adapting available methods. It is undertaken with an awareness of psychological and pedagogical cognitive theories, and with knowledge of appropriate techniques.

Central to instructional design models is the belief that the educational environment and the development of the learning process should be built on describing and analysing student needs and on taking students' particularities into account. Not only do these models determine the students' activities within the curriculum, but they also define the whole process and development of the educational environment and also indirectly influence the learning process. In the education process it is necessary to define the forms of feedback associated with the solution of learning activities and continuous formative evaluation, as well as the qualifying evaluations at the closure of certain phases of education with the help of the models. The educational environment based on instructional design models is indeed a complex education system, a system which also elaborates upon the planning of the learning process for the students.

In short, then, the application of modern instructional design models is necessary for relevant, up-to-date and effective e-learning solutions (Horton, 2011).

Goals

With the development of our own instructional design models, we have several aims unachievable with previous models. By developing the Nexius model our goal was to create a modern instructional design model, which can also operate in the market and not just in the world of non-profit state schools.

The contradiction between the innovative world of experiment and the predictability and stability required of e-learning services can only be uncoupled with the application of project-based, digital content-developing models. In this approach there is the opportunity to effectively harmonize planning, development and utilization while at the same time validating professional results within realistic frameworks. Innovative technological solutions can coexist with established principles of instructional design and content-development, while avoiding the risk of management issues. Project-based thinking can only utilize professional results in development if it approaches the learning process of the student, his learning tasks and his actual learning activities in an integrated manner instead of the concept of the conventional shared educational environment. The integrated educational environment is part of our instructional design model.

The project-based development of our instructional design, digital content-developing model is exclusively focused on an online educational environment and within that it targets the more effective development of a content-centred, instructive educational environment which supports individual learning. The online educational environment is effective for the student if it is optimized for the solving of learning tasks and learning activities. It offers opportunities for the regulation of educational process, in qualitative information-flow, in the repertoire of learning activities and in the individual activities of the students, making it unnecessary for students to engage with other educational environments or to look for other interactive opportunities in order to achieve their learning goals.

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The main principles of our instructional design model are the following: individual learning, developing an optimal educational environment for the individual, adjusting e-learning curriculum development to individual requirements and to expected student activities. The development of an e-learning curriculum in an online educational environment is ideal only if the advantages of cognitive theory, educational psychology and project-based development can prevail in developing educational content and in planning education generally.

The proposed Nexius instructional design model blends the teaching-learning-centred models (Bloom's taxonomy, Merrill's educational principles) with the development-production-centred models (ADDIE-, Dick - Carey – model) the purpose being to widen the scope of the individual models. It implements curriculum development via the project-approach taken from the world of business, thus merging the features of project management and instructional design. Not only does it provide theoretical solutions, but it also supports curriculum developers and practical implementation with concrete tools and advice during the course of application. It incorporates the latest results of psychological and pedagogical research, instructional design and digital multimedia curriculum development.

Methods

The necessity to develop the Nexius model was driven by practical needs under market circumstances. Although the developers considered each developmental project unique, in order to ensure quality and cost-efficiency it was thought practical to introduce steps which could be standardized.

For the development of the model, the developmental experience provided by more than a thousand pages of curricula was processed by those working on Nexius. The projects were analysed qualitatively: small-group and in-depth interviews were undertaken and the work processes of different projects were examined and compared with content-analysis. We mapped the tasks and roles of certain individuals in the process of development. The tasks were grouped, unified and put in logical order. The results were analysed and specified in cooperation with a didactics specialist and we established the modern education-methodological background and its base.

The Nexius Model

The model uses and applies current cognitive theories, theories of learning methodology, visual-communicational rules and instructional design solutions. Its principle is to represent an activity-based pedagogy based on motivating the students; it attempts to build a bridge with student's existing knowledge while trying to open paths to digital-based motivational opportunities (Ollé, Kocsis, Molnár, Sablik, Pápai, & Faragó, 2015).

Compared with previous methods, the Nexius-model approaches instructional design differently. It combines education-methodological support and organizational process focus.

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The model consists of 6 steps (Figure 1). Each step is completed with the establishment of a well-defined sub-product. These milestones are the exit documents in their establishing phase, and on which the next phase of the process is built, thus they are its access documents. There is only one exception to this, which is the synopsis:

- Milestone 1 is the Synopsis: in the writing phase of the Synopsis - as its name suggests- the synopsis of the curriculum (an overview) is developed. The description of the curriculum requirements, the definition and setting of its content elements and the circumstances of its application are expanded on here. This is the first sub-product of curriculum-development, the base-document of the curriculum.
- Milestone 2 is the Script: in this step the educational content is developed, which is created based on the goals and syllabus set in the synopsis phase and which is methodologically sound – although its structure is not final – and it provides the foundation of and the background to, the curriculum. It is the second sub-product of the developmental process.
- Milestone 3 is the Activity Plan: in this stage, the educational content is further refined with methods developed for electronic curricula. The concept of the student's interaction with the curriculum is elaborated in this phase. The draft of the electronic educational content – divided into lessons – is developed at this milestone, it is not yet complete enough to be included in a curriculum-developing system.
- Milestone 4 is the Screenplay: the draft, which was developed in the previous step, is further structured. The opportunities of the curriculum–development system, selected for the curriculum planning, have to be considered during this process. Therefore in the process a textual description of the electronic educational content – is developed from the exit document of the previous phase. This sub-product already contains the description of the final, editable texts as well as the media-elements.
- Milestone 5 is the Electronic Curriculum: the first version of the electronic curriculum is developed via Creative design. The material developed over the previous steps is fleshed out and attains real form here with the help of technology supporting curriculum-development and with the assistance of editors and IT specialists.
- Milestone 6 is the Finished Curriculum: in the last phase of the process, the final version of the Electronic Curriculum, the Finished Curriculum is developed after checking, testing and error-correction.

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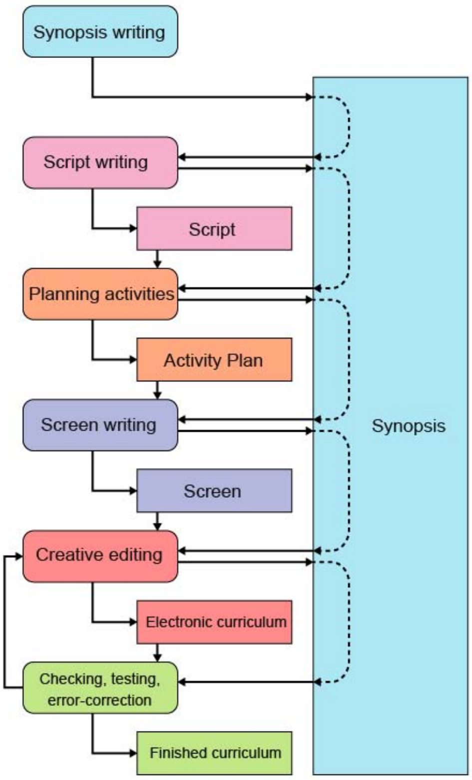

Figure 1. The Milestones of the Nexius-model

In the model, the sub-steps within the main steps are clarified in full: why they are necessary, how they are prepared, their makeup and what requirements they have to meet to be acceptable.

The model also delineates the activities of the participants. It separates the different functions, while stressing that a person can have more than one function. The exact number of people participating in the development can vary, although each function has to be present in each case.

The model defines the following roles: procurer; project-leader, project manager; instructional designer, educational expert; methodological expert; subject matter expert; screenwriter; editor; proof-reader (linguistic, professional, technical, educational); student testers.

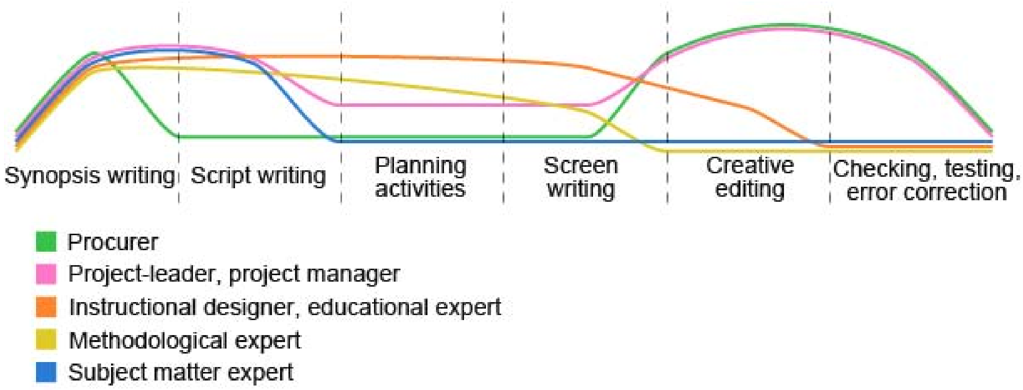

Figure 2. The illustration of how the different participants are represented in certain phases of the project

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Scheme Groups and Curriculum Schemes

The methodological, instructional design background of the model is anchored in the curriculum-scheme system, which adjusts the methodological framework and concrete guides – which will be used in practice – to the particular conditions by taking different parameters into account regarding implementation.

The curriculum-scheme framework allows for different methodological approaches by taking the educational goals, the particularities of the students and other features into account. Based on the above parameters, we define which 4-4 curriculum scheme out of the three main scheme groups (regulated-, adaptive-, discovery learning) will be applied in the course of development. The curriculum schemes are grouped based on the relation to the students and on the ideas about learning. Each curriculum scheme focuses on a different understanding of the learning process and as such cannot be combined, so a decision in favour of one has to be taken during the process of curriculum development.

The Three Main Scheme-groups

Adaptive learning

In the adaptive scheme-group the script is primarily knowledge-based, access to the curriculum is not excessively strict. It is possible to count on the student's learning experience and motivation, but the work with the curriculum follows a pre-defined path. The curriculum conveys concrete knowledge with little emphasis on the abstract, and a rigid internal system. The educational aims are elaborated through the medium; we can clearly state the concrete aim and role of each and every chapter and lesson (even to the extent of comparing it with others) in the curriculum.

Sub-schemes:

- Information-transferring;
- Inductive;
- Deductive;
- Integrating.

Regulated learning

Tasks, which are appropriate for practice, are dominant in the regulated scheme group and access to the scheme group is somewhat restricted. It is suggested that for such a scheme each and every step of the learning process has to be directed. If it is important that each step of the student is directed then the flow of learning has to be influenced the most. The curriculum is presented in a highly regulated manner within the framework. The curriculum's system of concepts is tied, the inner structure of the curriculum either cannot be or can only slightly be altered and the curriculum greatly resembles the students' book or an advanced-level practical book. The educational goals suit the content well. Learning with this curriculum means it is easy to discern at any stage what the aim is and to what extent it contributes to achieving the educational goals.

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Sub-schemes:

- Practising, developing practice;
- Teaching activities and actions;
- Developing competency;
- Optimal acquisition.

Discovery learning

In the case of the curriculum belonging to the discovery learning scheme-group, curiosity-arousing and interesting tasks, those which make you think, have to dominate. The student decides what path he wants to take in this curriculum scheme. This curriculum is effective if the responsibility for learning can be placed squarely on the student. The curriculum is generally small and rather general, it contains open-ended questions and it is not possible to prepare exercises to check progress. The teaching content, the inner structuring of which can be re-ordered randomly and typically has instructive parts, belongs in this group. In this scheme the aims are general, in most cases there are affective requirements or cross-curricular aims regarding the whole curriculum are elaborated.

Sub-schemes:

- Processing experience;
- Problem-solving;
- Explanatory analysis of case-study;
- Sensitization and view-formation.

Present and Future

The practical application of the model has already commenced. Our present aim is to justify the model with research and, depending on the findings, to adapt it. In order to examine the curriculum scheme's system, research is planned which will compare the performance of a single curriculum framed within different schemes, thus providing an opportunity to justify the existence of certain categories. Based on the initial results, the effectiveness of the developmental process has increased; it can be characterized by more conscious planning, more effective sub-processes, a quality curriculum and customer satisfaction.

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E-LEARNING DECISION MAKING: METHODS AND METHODOLOGIES

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Abstract

Strategic decision making implementation is still an important problem in higher education (HE). The shift in research moved from goals and activities towards recognizing decision making methods used for decision making (DM) and evaluation of the strategy implementation. The purpose of this paper is to investigate which decision making methods and methodologies are used in the decision making processes in higher education, especially strategic decision making problems connected to the implementation of e-learning. In order to achieve this goal we reviewed 40 research papers. Results show diversity of methods, methodologies and approaches used in the strategic decision making in HE which proves complexity of the topic. We summarize them in four phases and also recommend methods that can be successfully applied based on the literature review presented in this paper and authors' practical experiences.

Introduction

For the purpose of this paper the term *e-learning* covers a range information and communication technologies (ICT) usage in formal education; starting from using ICT in classrooms, blended learning, open and distant learning, online learning to the use of massive open online courses (MOOCs), e-portfolios, social media technologies, open badges, and so on (Divjak & Begicevic, 2015). The implementation of e-learning in HE is one of the important strategic decision making problems because it influences all HE participants, from students and teachers to HE management (Lerner, 1999) and, as well as a smart implementation, it requires a shift in the pedagogical paradigm. Different approaches, methodologies and decision making methods can be used in decision making processes in HE. On the other hand all of them are not appropriate for the problems that relate with the application of some e-learning form/technology. The research on this paper is in the scope of the project "Development of a methodological framework for strategic decision making in higher education – a case of open and distant learning implementation" (HigherDecision) supported by Croatian Science Foundation and planned for the period 2015-2019 (http://higherdecision.foi.hr). The primary goal of HigherDecison project is to develop a complete methodology for strategic DM and monitoring of its implementation in HE. Two basic components of the project are: (a) Development of methodological framework for strategic DM and monitoring of its implementation; (b) Application, adjustment and evaluation of methodology on the example of decision implementation on e-learning (ODL). In our methodology, the Deming cycle was modified as shown in Figure 1. Deming cycle implies constant improvement of the system's ability, this being the aim of quality management. This cycle consists of four phases: P (plan) – determination of the mission, vision and strategy, planning and establishing of objectives; D (do) – applying the processes, performing; C (check) – supervising and measuring of the process and their results considering objectives and indicators; A (act) – improvement of the process. The cycle of strategic decision making, consists of four phases: (1) Identification and research of the problem, (2) Development of the methodology of strategic DM, (3) Implementation and monitoring of strategic decision and (4) Evaluation of the effects of strategic decision. Details can be found in (Divjak & Begicevic, 2015).

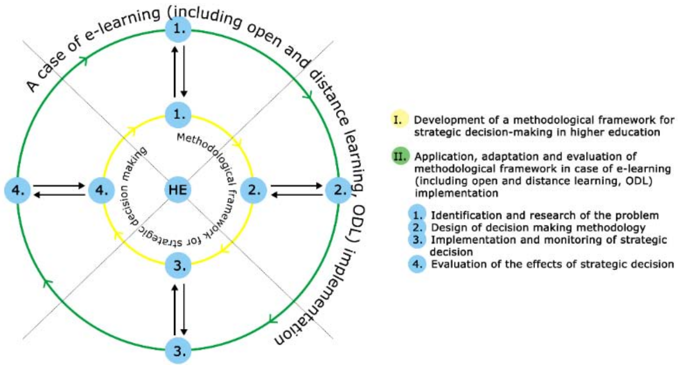

Figure 1. Double cycle of strategic decision making – case study of e-learning (including ODL)

Research – systematic literature analysis

In the fields of e-learning, strategic decision making and higher education there are a lot of papers dealing with these topics individually. In this paper we consulted papers which deal with topics from at least two of three mentioned fields at the same time. Name of fields were used as the keywords in database search. Databases included in the search were the following: Scopus, Science Direct, Wiley Online Library, Web of Science and Academic Search Complete. Search results gave us more than five hundred papers which meet the selected criteria, especially when searching without search limitations (searched keywords in abstracts and paper keywords; last 10 years; journal papers/proceedings). Finally we got to 40 papers presented in the continuation of this paper.

Example of AHP and ANP use

E-learning implementation is a strategic decision for HE institutions (HEI). Phases of strategic planning of e-learning implementation are defined in the paper (Begičević, Divjak, & Hunjak, 2007a). Authors dealt with the problem of prioritization of e-learning alternatives at the level of department/course. In the presented case study, after applying a four phase decision making cycle, factor analysis and AHP method (Analytic Hierarchy Process), the most appropriate form of e-learning, at the level of department/course, was blended learning. The same authors in their paper (Begičević, Divjak, & Hunjak, 2007b) dealt with the prioritization

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of e-learning alternatives at the level of HEI. For HEI level Analytic Network Process (ANP) was used. After applying the given method to the case study, the most appropriate form of e-learning at the level of faculty was blended learning. The AHP and the ANP methods were also used in the paper. Authors (Shu-Hsiang, Jaitip, & Ana, 2015) used ANP and AHP as well to measure the degree of alignment of a university's strategic objectives with results obtained by faculty through its knowledge transfer mechanisms. In case of Universidad Nacional de Colombia misalignment was detected. When talking about the application of AHP to strategic problems in HE, there are some other examples of AHP application. In the paper (Liberatore & Nydick, 1997) AHP was applied to two problems: the evaluation of academic research papers and institution-wide strategic planning; and two models were defined: model for awarding best papers and model for making a strategic plan of HE. Yusuf and Salleh used AHP method to create the model of evaluation of HE institutions in order to decide about upgrading the status of private HE institutions (Yusof & Salleh, 2013). In the paper (Gregov & Hunjak, 2014) authors discussed the development of a criteria set for employment in HE. Other example of applying the AHP method in HRM (human resource management) in HE is the evaluation of faculty employees' performance (Badri & Abdulla, 2004). Authors came with the model that can be applicable at department, faculty and university level. In (Huang & Chiu, 2015), AHP method is applied in creating Evaluation model for CAML (context-aware mobile learning). AHP method is often applied in combination with some other method. Ho, Higson and Dey used integrated approach, and by using AHP method and goal programming they dealt with resource allocation to project proposals at faculty level (Ho, Higson, & Dey, 2007) which is also useful when talking about e-learning projects. In (Labib, Read, Gladstone-Millar, Tonge, & Smith, 2013) AHP method is applied together with knapsack method in the problem of creating framework for the formulation of a HEI strategy. They defined a novel approach for classification (prioritization) of one of the most critical issues in HE – strategic investment. The way that HE institutions contribute to economic development by drawing on evolutionary economics and the national innovation systems approach is given in (Kruss, McGrath, Petersen, & Gastrow, 2015) and Social Network Analysis (SNA) is applied.

Example of DEA use

Authors (Ho, Dey, & Higson, 2006) reviewed 25 papers which focus on four major HE decision problems: resource allocation; performance measurement; budgeting; and scheduling. Methods used in that paper are the following: statistical models, DEA, regression, AHP and goal programming. In another literature review (Jani, 2013) Jani presented several applications of TRIZ (Theory of solving inventive problems) in HE. Data Envelopment Analysis (DEA) is also used in strategic decision making in HE, for example in paper (Kabók, Kis, Csüllög, & Lendák, 2013) in which competitiveness of higher education in selected countries / regions in Europe is discussed and (Furková & Surmanová, 2015) where scientific activities of Slovak economic faculties are evaluated by using DEA together with PROMETHEE.

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Example of BSC, TQM and KPI use

Authors (Fooladvand, Yarmohammadian, & Shahtalebi, 2015) gave recommendations for the application of strategic planning and Balanced Score Card (BSC) in higher education quality. In paper (Hladchenko, 2015) comparative analysis of 4 case studies, in which BSC is used, is done. Author defined a general framework of BSC for HE institutions. Authors (Akyel, KorkusuzPolat, & Arslankay, 2012) presented strategic planning of the Sakarya University based on Total Quality Management (TQM). Paper by (Lillis & Lynch, 2013) considers whether the strategic planning models used in the past decade will be able to meet the challenges presented by unprecedented economic circumstances and the new national strategy for HE in Ireland. Strategic planning of marketing campaigns in reaching the target audience is discussed in (Alotaibi & Muramalla, 2015). In paper (Ahmad, Farley, & Naidoo, 2012) the improvement of the efficiency and effectiveness of strategic planning in higher education institutions by using Key Performance Indicators (KPI) is discussed. Marshall suggested maturity modelling for measuring the quality of e-learning (Marshall, 2012). Authors (Ghavifekr, Afshari, Siraj, & Abdul Razak, 2013) presented key strategies and policies for effective organizational implementation of systematic change in the context of an ODL organization. Important factors that help determine the success or failure of online programs were identified in (Rovai & Downey, 2010).

Examples of theories use

Paper (Garnett, Bevan-Dye, & de Klerk, 2011) uses quantitative methodology for analyzing performance measurement of HEI that use deliberate strategies. In (Gorgan, 2015) data driven decision support system for higher education is designed. Authors (Raluca, Alecsandru, Aniela, & Vasile, 2012) applied game theory in strategic planning. Furthermore, (Broad, Goddard, & von Alberti, 2007) used grounded theory to present the relationship between strategic planning, accounting and performance measurement systems in local government and higher education. A framework for institutional adoption and implementation of blended learning in HE is created in (Graham, Woodfield, & Harrison, 2013). By using the results of focus groups and individual interviews, King and Boyatt explored factors influencing adoption of e-learning within higher education: institutional infrastructure, staff attitudes and skills, and perceived student expectations (King & Boyatt, 2015).

Examples of EDM and LA use

In paper (De Morais & De Araújo, 2013) Educational Data Mining (EDM) approach for identifying which factors are most relevant at an e-learning course is analyzed. Decision Tree is the decision making method used in this approach. Authors (Ćukušić, Alfirević, Granić, & Garača, 2010) presented a comprehensive model for managing the e-learning process in HE. When talking about managing e-learning, Yamada analyzed Japanese case studies and presented practices in which MOOCs acted as catalysts, implementing component technologies and development strategies for e-learning (Yamada, 2016). Critical success factors of MOOCs are discussed in (Poy & Gonzales-Aguilar, 2014). Four factors were identified and measured, namely, educational software design, dropout rates, universal scope,

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and business strategy. Authors (Macfadyen & Dawson, 2012) use change management methods to give the answer to the question of importance of learning analytics (LA) for strategic decision making. They concluded that e-learning analytics form should be combined with data visualization and participant observations. In (Bassoppo-Moyo, 2008) the importance of incorporating needs assessment and strategic plan when implementing any instructional innovation that is governed by basic learning principles is pointed out.

Examples of SEM and CBA use

Structural Equation Modelling (SEM) is also used for decision making on e-learning in HE. For example (Ahmed, 2010) assesses hybrid e-learning acceptance by learners using three critical success factors: instructor characteristics, information technology infrastructure, and organizational and technical support; paper (Dachyar, 2015) deals with the development of strategy model for organizational innovation through information systems in higher education in Indonesia. In higher education, the most significant factor in improving organizational innovation performance is organizational change. Cost Benefit Analysis (CBA) is used in methodologies of identifying variables that influence the development of e-learning services (Fenu & Picconi, 2010). Whether the e-learning services will be successful or not depends on many factors. By using literature review, paper (Rovai & Downey, 2010) examines those factors. These factors are planning, marketing and recruitment, financial management, quality assurance, student retention, faculty development, online course design and pedagogy.

Conclusion

As we can see from the previous section, many different methods, approaches and methodologies have been used in research papers dealing with strategic planning and decision making in higher education or e-learning. AHP method was especially used in several papers on strategic decision making in higher education. One of the reasons lies in the fact that it enables group decision making which is being often applied to problems in HE. Other frequently used approaches are Balanced Scorecard, Total Quality Management, Change Management, Process Management and more general approaches like four phase decision making model and Deming's cycle (Plan-do-check-act). Many papers we considered deal with case study approach and analyze how certain problem is solved in a concrete context, and those papers make useful recommendation for solving similar problems in other context. Some of the other existing methods related to the decision making on e-learning implementation in HE are: ANP, DEA, cost-benefit analysis, qualitative and quantitative analysis based on questionnaires, focus groups and interviews, TOWS, Promethee, TOPSIS, goal programming methods, social network analysis, factor analysis, structural equation modelling and game theory. In order to systemize and improve the use of decision making methods we proposed the methodology called strategic decision making cycle including four phases as is described in (Begičević & Divjak, 2015). We also listed methods that can be used in each phase, as well as some specifics of decision making in HE, especially regarding e-learning. A summary is given in Table 1.

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Table 1: Summary of decision making methods in HE focused on e-learning

Phase of the cycle	Approaches	Specifics of HE and e-learning	Methods and methodologies
Identification and research of the problem	Needs and situation analysis Readiness assessment Diffusion of innovation	Stakeholders' involvement E-readiness Consciousness raising	*Situation analysis (Document analysis)* Case study research Different types of qualitative analysis Structural Equation Modelling (SEM) Social Network Analysis (SNA) Grounded theory Game theory *Educational Data Mining and Learning Analytics (LA)* Methodology for e-readiness assessment *Problem tree with Decision tree* Statistical methods
Development of methodology for DM and decision making	Analysis of potential solutions MCDM Cost-benefit and risk analysis	Benchmarking of HEIs Modelling dependencies and group DM (AHP & ANP with BOCR)	*BOCR AHP and ANP*, PROMETHEE, ELECTRE, TOPSIS Ideal point-based MCDM Multi-criteria variant of cost-benefit analysis Hybrid methodology of risk management – Monte Carlo simulation and Sensitivity analysis Different types of qualitative analysis Factor analysis, Clustering Game theory Goal programming, Knapsack method TRIZ (Theory of solving inventive problems) Decision Tree
Implementation and strategic decision monitoring	BSC, KPI, BPM CMMI PPM	Interpretations of econometrics and use of KPIs and PPM	*BSC Balanced Scorecard* Enterprise Architecture for BPM (Business Process Management) CMMI (Capability Maturity Model Integration) Econometric methods (ROI, productivity, efficiency, profitability) DEA (Data Envelopment Analysis) Total Quality Management
Evaluation of effects of the strategic decisions	Qualitative, quantitative and mixed methods Structural causal models	Stakeholder perspective analysis In-depth case study to find out causes & effects	Qualitative methods - stakeholder perspective, document analysis, internal consistency of the strategy and external effectiveness, benchmarking, *in-depth* case study, Delphi Quantitative methods - econometric analysis, cost-benefit analysis, *multi-criteria analysis and regression analysis* Causal modelling *Educational Data Mining and Learning Analytics (LA)*

There are recommended methods (bold letters) in each phase that can be successfully applied in HE setting based on the literature review presented in this paper and authors' practical experience. Application of other methods and methodologies is feasible only with the

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engagement of supporting tools, additional human and financial resources as well as training of the staff involved in decision making.

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SUSTAINABILITY FOR WHOM? PLANNING FOR STUDENT SUCCESS IN OPEN EDUCATION AND DISTANCE LEARNING

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Sustainability lies at the heart of the new UN Development Goals (the SDG's) for the period 2015-2030, and education has a specific Goal, namely

> *"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." (UNESCO, 2015)*

The very significant growth in post-secondary education demanded world-wide, from some 260m to 400m learners, will need the development of open education and distance learning systems (OEDL) on a substantial scale. Even in Europe, as a developed region, there will be the need to contribute to this priority not only in overall growth in particular in some countries but also in population segments that remain with higher levels of exclusion, and also more widely from the perspective of quality for OEDL.

This paper, which draws on an ICDE report (Tait, 2015) takes student success as a core element of quality for the sustainability of OEDL, and therefore for post-secondary education to contribute to sustainability for our societies in the future. Student success rates are widely reported to be lower for part-time than full-time students, and lower for OEDL than for part-time students as a whole. There is an imperative to improve student success rates firstly for the sake of students who invest their self-esteem, time and money in OEDL programmes, and also for the reputation of OEDL's contribution to educational systems and of the institutions who teach significantly or entirely using OEDL methods (Grau-Valldosera & Minguillon, 2014; Hart, 2012). As major effort goes into fulfilling UN SDG 4, OEDL programmes will need to improve student success rates to make a reality of the UN aspiration for significantly higher numbers of successful post-secondary and lifelong learners.

Student success in open education and distance learning programmes

The first issue to be addressed is to ask what is specific to OEDL programmes in relation to student success. It is certainly widely, though not universally, the case that student success in part-time modes of study is less than that of full-time students, and within the part-time cohorts students on OEDL programmes generally do less well in terms of module and qualification completion than part-time campus based students. Exceptions to these generalisations have been recorded, for example in a case where students in an online programme have completed at higher levels than the parallel campus-based programme, due it is argued to very effective learning design (Creelman & Reneland-Forsman, 2013). However, overall for the OEDL sector there is an issue to be addressed of lower rates of student success in OEDL programmes, both objectively where data reveals that, and in less formal terms of perception and reputation.

If we accept in the first place that rates of student success are an issue for OEDL programmes, care is needed in proposing explanations of cause and effect. There are in everyday discourse two main poles of explanation: the strengths and weaknesses of the students who study in these programmes, and strengths and weaknesses of OEDL modes of study themselves. The challenges for successful study of part-time students, who form the great majority of students on OEDL programmes, are well known. Students on OEDL programmes are more likely to be

- adult or post-experience, in the sense that they have not come to study directly from school;
- be studying in the post-secondary sector;
- be part-time students with family or work responsibilities, or both;
- have gained access to programmes of study that are more open than those of the elite universities.

In addition, students on OEDL programmes may to a greater or lesser extent depending on the educational culture and history of their country come from families with less or no history of post-secondary education, and to come from lower socio-economic demographic cohorts than those in traditional universities or programmes. These students are admitted to study, especially at undergraduate level, because their path to post-secondary education has not been smooth or easy. Institutions who seek to admit and serve these OEDL students take a deliberate and purposeful risk in doing so, in accordance with their mission and values (Tait, 2014).

However the achievement of institutional mission driven by the values of access and inclusion can be threatened from a number of perspectives, which have to carefully managed. Firstly, institutional missions that are focused on access and inclusion are in conflict with the mission of those institutions who have developed narratives of excellence based on selection and exclusion, and who widely dominate accounts of excellence and hierarchy in education. There will always be voices who ask if *these sorts of people* – i.e. the wider and newer population cohorts served by OEDL programmes – are worthy of educational opportunity, and these voices are often influential in shaping wider social attitudes to institutions that choose to offer OEDL programmes.

Secondly, students who come forward to study without the social and cultural capital of the elite are also taking a significant risk in terms of self-esteem, money paid in fees, and time committed to study at the expense of family and leisure. This mission of access and inclusion must mean that the institutions offering OEDL programmes need, in partnership with students, to manage that risk in transparent and responsible ways. The opportunity for success will however always have in these contexts a higher risk of failure than those institutions who teach the children of families who have often already enjoyed post-secondary

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education, who study full-time straight after school, and who regulate admission in conventional and selective ways. As reported in the USA context "graduation rates were highest at post-secondary degree-granting institutions that were the most selective (i.e. had the lowest admissions acceptance rates), and graduation rates were lowest at institutions that were the least selective (i.e. had open admissions policies)" (National Center for Education Statistics, 2015). The mission of inclusion and access which for the most part is that of OEDL Programmes lies therefore in seeking to achieve something different from the elite universities, and can be proud of that.

This ambition is sometimes explicitly reflected in mission statements, or is informally part of the goal of being more flexible and accessible. It needs however to be understood by those planning OEDL programmes, and senior leadership in institutions which decide to diversify their mission into online or blended programmes, that they will be more likely to admit students with lower grades of High School leaving certificate or entry qualifications and with the challenges of managing part-time study with working life and family responsibilities. This will impact negatively on module and programme completion outcomes as compared with traditional full-time student in highly selective colleges or universities. This takes nothing away from the value and importance of a mission that attempts to widen opportunity and contribute to sustainability in societies for the future. But it brings a particular set of responsibilities that must focus on supporting opportunity and success at the same time as widening access. There is clearly a tension between wanting to maximise registration numbers and being responsible in advising intending students about their preparedness for study. While the responsibility may in the end lie with the student to take the decision, it must be in a context of ethical recruitment practice that is closer to advising a client than selling a product. There is sadly and shamefully a history in OEDL of commercial motives conflicting with that sense of responsibility, and too many recent instances of institutions, in particular private for-profit colleges, where admissions practice has not been ethically and transparently managed, to the severe detriment of the students who pay high fees, and accumulate debt without the benefit of qualification. These debts have in the recent episode in the USA been supported by government and taxpayer who make loans which are at severe risk of non-repayment and default (Economist, 2013).

This is the background for student success in OEDL. The remainder of this paper is concerned with summarising the range of practices that best support student success for sustainability (for an overall introduction see Brindley, Walti and Zawacki-Richter, 2004).

The framework of practice to support student success

A framework to support student success is an organic whole-institution system, that is to say it must be based on the student's whole experience of study. It is sometimes in accounts of practice limited to a heading of student support, but important though this element is, this is an inadequate approach to supporting the overall student experience.

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In summary there are a number of key elements that support practice for student success:

- pre-study information, advice, guidance and admission;
- curriculum or programme design for student success;
- intervention at key points and in response to student need;
- assessment to support learning as well as to judge achievement;
- individualised and personalised systems of support to students;
- information and logistical systems that communicate between all relevant participants in the system;
- managing for student success.

The deployment of these elements in OEDL programmes and educational systems will of necessity reflect the specific programme needs, institutional capacities, technology affordances and cultures and histories of the country or region.

Pre-study information, advice, guidance and admission

This stage in the cycle of activities in a student's engagement with the institution is crucial. As noted above it is here that the tension between student acquisition and business growth, the ambitions of both student and institution in terms of opportunity, and the ethics of supporting clients rather than achieving sales targets are felt at their most acute.

Marketing

Sales and marketing activities are essential if the institution is to make its offer known to relevant sectors of the public. However, misleading statements, for example, about how easy it is to study will lead some students to register on an unrealistic basis and to individual disappointment and high dropout statistics.

Information

Information on all dimensions of study must be clear to the enquirer, including recommended educational levels needed for the programme, time needed for study, number of years needed to complete the programme, the curriculum character of the programme including learning and work-related outcomes, the systems for student support, assessment schedules, and fee levels and the nature of the customer commitment.

Advice and guidance

There need to be channels of communication open to enquirers so that he or she can engage on an individual basis with questions about study. The advice and guidance staff should have their professional goals derived from enquirer satisfaction, not sales targets.

It is here that the channels of communication in terms of technology will need to be selected according to the needs and capabilities of the enquirer cohort. These may include face to face, letter, telephone and email, or a combination of these, and may include newer practices of

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web-based access to peer support through wiki's, and to study materials (Ali & Fadziel, 2012). There should be quality assurance for this, as for all other elements that support student success, to include systems to provide feedback on accuracy, helpfulness and timeliness of enquirer interactions.

Admissions

The interaction with the enquirer may lead to admission, and if so should be managed on a transparent basis in terms of commitments to patterns of study, cost and commitment. Interaction with the enquirer may also lead to a decision by the enquirer or the institution not to proceed with registration, and this should be regarded as a legitimate outcome.

Curriculum or programme for student success

Innovation in OEDL systems has focused much on learning design for student success, significantly because teaching in new ways demanded attention to the process of learning that might be assumed in the past in campus based systems. These have included the pioneering of learning outcomes, continuous assessment derived from those learning outcomes, the use of diagrams and other visual supports in learning materials, and the use of radio and television for both core and supplementary teaching. Effective learning design will deliver, amongst other things, student engagement, that is to say will support a positive engagement between the learner and his or her programme of study. The resilience of that engagement is core to delivering student success and mitigating drop-out.

Curriculum relevance is also key. It is essential that the module or programme is accurately described in the documents that form the basis of the student decision to pursue that area of study. The nature of programmes of study derive from a range of determinants or influences. These are driven in OEDL contexts above all by what students want to study, in other words by the market. But that market can be substantially influenced by what institutions tell students is relevant and valuable, especially from the employment and livelihood perspectives. This needs to be honest and not unrealistic in terms of possibilities, and will demand outcomes in skills and competence as well as academic knowledge. It may demand knowledge of labour market trends, insofar as they can be understood. Other drivers of curriculum design will include regulation from government as well as in some cases from professional bodies; academic understanding of disciplines and academic currency; and the major issues that are important in society e.g. sustainability; HIV-AIDS; and ethics. These may well not all be in alignment and considerable skill is needed to resolve tensions between them in a compelling curriculum offer.

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Intervention at key points and in response to student need

The stages of the student experience provide the structure for organisation of learner support and in particular intervention to support individual students. These are commonly represented as:

- pre-study: post registration, and review of readiness to start;
- in-course: early contact; first assignment; mid module; qualification progress check; preparing for examination;
- through qualification: support for next module choice and qualification planning.

Intervention should be both universal, taking the points in the schedule above as times when all students may need support; and individual when prompts reveal that a student is having difficulty or not making progress, for example failing to submit an assignment. Intervention has been practised in many OEDL systems for many years, and has been demonstrated to improve student completion. The capacity to utilise digitally-held data in real time - the practise of learning analytics - now makes intervention potentially much more immediate and powerful. It is clear that learning analytics has significant potential to support student success, but remains at this stage relatively unfulfilled as a practice. There are also ethical and legal issues about data protection which have yet to be fully resolved, in particular in some jurisdictions (Slade & Prinsloo, 2013).

Assessment

Assessment plays a crucial part in supporting students to success. It is integral to learning design and pedagogy, not as an add-on at a subsequent stage. Assessment strategies are originally derived from the learning objectives of the module, and include both knowledge and skills. OEDL programmes have for many years used both formative and summative assessment, and both continuous and final assessment. This range of assessment practices acknowledges the needs of adult learners. Online learning systems now have the capacity to provide frequent shorter assessment tasks which support student engagement and diagnose learning at shorter intervals, thus supporting student success.

Personalised support

At the heart of a teaching system which operates at a physical distance from its students to support them to success lies its capacity to provide personalised support: in other words to recognise and respond to the learner as an individual. It is here in particular that the roles of tutor, counsellor, guidance worker, and careers advisor have developed, supported by information systems (Sungkatavat & Boonyarataphan, 2012). The advent of the web has made possible the potential of much easier student-tutor and student-student communication, through email and electronic conferences. In some OEDL systems student support is enhanced through social clubs and networks. The development of student peer support through Facebook, wiki's and other similar crowd approaches offers much for student support.

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While the creation of learning resources is for the most part uniform for all learners, and benefits from the cost-effectiveness of scale, individualised support to students has the opposite cost dynamic, i.e. it increases with the number of students. There will therefore need to be serious consideration given to how much of an overall teaching budget is given to the production of learning resources, and how much to individualised student support. Too often in the institutional histories of OEDL the resources have been allocated to production of learning materials, with individualised support coming into the budget as an afterthought. A holistic and transparent approach that recognises the importance of both elements is more likely to lead to the most effective outcomes in terms of student success.

Information and logistical systems

The combination of logistics and information systems has in one form or another been crucial to OEDL programmes from correspondence models to today's online. The contribution to student success of effective and timely management of learning embedded in learning and teaching materials, assessment, and learner support services is central. Learner Management Systems (LMS) have provided an integrating framework for many years now, from both commercial and open source models, e.g. Moodle.

Managing for student success

All of the above mean that Student Success is at one and the same crucial to the purposes of OEDL programmes and institutions and challenging to achieve, at least as compared with highly selective post-secondary systems. Attention to this proposition underpins the ways in which quality for sustainability can be made a reality for OEDL programmes in the future, and for the realisation of UN SDG 4 for education.

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MOBILISING LEADERSHIP FOR INNOVATIVE OPEN AND DISTANCE EDUCATION IN THE 21ST CENTURY

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Introduction

The key to transforming the capacity of online and open education is leadership. More precisely, it is the capacity of leaders to transcend organizational and market barriers and lead change. Leading change requires a systematic approach to examining educational, economic, political, social and cultural factors that collectively create the optimum environment for systemic change (Hickman, 2010; Burns, 2010; Yukl, 2013). Conversely, failure to optimize an effective change strategy will result in failure regardless of the charismatic and perceived talents and skills of leaders (Kotter, 2012; Yukl, 2013).

Indeed for ODL universities to boldly go where no leader has gone before requires leaders to clear their experiential deck of processes and strategies that whilst effective twenty years ago are obsolete in the 21st century organization. This is a formidable challenge for all of us. It requires us to think differently about how we think, how we teach, and how we learn; and to resist a fundamental tendency of human nature – to retreat to the status quo where we feel comfortable and safe from ambiguity and the unknown. Transformation is entirely about leadership; digital technologies are simply enablers for this transformation in the hands of the right leader, for the right reasons, and the right partners (Burns, 2010; Hickman, 2010; Yukl, 2013).

Leadership, like learning, is about making connections. In the digital world the range of teaching-learning connections permeates the teaching and learning environment. We connect new knowledge to existing knowledge; we connect the digital world with the real world; we connect students to content, students to students, and students to teacher. We connect the classroom to the world, competencies to skills, individuals to groups, and groups to communities. And, most importantly, we connect technology to information – information to knowledge and knowledge to application in the real world. We connect students to life (Olcott, 2014).

Similarly, transformational leadership is about making connections (Burns, 2010). Leaders must connect to stakeholders and customers; leverage organizational staff capacity to compete and connect knowledge and emerging trends with strategy. Leaders must connect with communities and partners to define what differentiates their organization in the marketplace.

Most importantly, the new normal for 21st century leaders requires looking through a new lens from different vantage points at their organisations and the environments where their universities function.

This paper will examine the process of leading change within the context of online and open universities. The focus will be on the process of leading effective change drawing examples from the open and distance learning. Moreover the paper will offer a set of recommendations of how leading change in and of itself requires a new leadership mindset – open to new ideas, self-assessment, and re-distributing the leadership paradigm across the entire organization.

Defining leadership

Before we can analyse the process of leading change, we need to set the stage for the discussion with a basic definition of leadership. Kotter (2012) articulated a sound distinction between management and leadership. He wrote:

> *"Management is a set of processes that can keep a complicated system of people and technology running smoothly. The most important aspects of management include planning, budgeting, organising, staffing, controlling, and problem solving. Leadership is a set of processes that creates organisations in the first place or adapts them to significantly changing circumstances. Leadership defines what the future should look like, aligns people with the vision, and inspires them to make it happen despite the obstacles." (p.28)*

Why is a working definition of leadership important for our discussion? First, it distinguishes the differences between management and leadership. In ODL, good managers (learning design, technology specialists, assessment experts, online tutors, etc.) are, in one sense, the management aspect of the ODL enterprise. Leadership, however, is the driving force for setting the organisation's direction, future vision, and core values for staff. In ODL, good distance education leaders need to have a good understanding of education and distance education pedagogies and theories; are able to effectively manage conflict and transformational change; can plan strategically, create a distance education vision, and guide others toward that vision; can perform market analyses and environmental scans to identify areas for innovation and change; and can navigate institutional culture and complex, changing, and ambiguous environments (Nworie, 2012; Simonson, 2004; Beaudoin, 2002; Nworie, Haughton, & Oprandi, 2012; Irlbeck, 2002). Managers do things right. Leaders do the right things and take the organization where others lack the vision and foresight to aspire to a new level of optimum organisational efficiency and excellence (Bennis & Nanus, 1985).

Secondly, the fundamental responsibility for leading the ODL enterprise rests with the senior executive – whether a Vice Chancellor or President at a single – mode online learning institution; or the appointed leader within a dual mode institution. The leadership context within each is somewhat different but the overall leadership and leading change responsibility rests with this individual. For our purposes, here this does not mean the all-knowing single

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leader is the sole guru of visionary leadership and approaches – it simply means the change process emanates from this individual.

Leadership at the crossroads

Can we be so audacious as to say that leadership in higher education, specifically in open and distance learning, is at a crossroads? Yes, in fact, we can go a step further and say that the evidence in recent years clearly points to a failure in leadership at the highest levels. In deference and respect to our colleagues across the profession, institutional names and CEOs have been omitted here in citing some high profile examples (Keegan et al., 2007).

- In one case a leading global ODL university attempting to take its university abroad resulted in failure. The leadership failed to do its homework and understand the markets and regulatory environment it was trying to enter. The institutional model worked effectively in the home country whilst failing in the new market. The institution was also unwilling to compromise and adapt its model for the new market (Keegan et al., 2007).
- Conversely, in another high profile ODL university the CEO decided that issues in support of overall faculty welfare and morale were not a priority. This approach increased enrolments and revenues at the expense of the faculties. This CEO was summarily dismissed without explanation to the public or to the institution's stakeholders.
- A third example stemmed from investing millions of dollars in the wrong things at the wrong times for the wrong reasons. Again, the flawed assumption that in today's complex markets, one single leader can navigate all the issues relevant to institutional sustainability. This assumption was and is a fallacy.
- A fourth example resulted in the CEO calling it a day and leaving voluntarily. The institution was globally re-known but political and economic winds changed in the home country – the leader had no insights into a change strategy to re-position the university to adapt. A key principle in this paper is that having all the requisite leadership skills and experience are irrelevant if the leader does not have the capacity to lead effective change. Action speaks louder than words and rhetoric will not save the ship – only a highly responsive and adaptive change strategy can do this. Relying on old leadership principles much like the ill-fated Captain of the Titanic ... the prevailing thinking could not avoid the market iceberg.
- In a final example, a dual-mode driven ODL system of universities that had developed over fifteen years and positioned itself as a leading global provider of open and distance learning was dismantled after the Board of Directors felt the system should rethink excellence. The supreme irony? Excellence was already there and was cited by numerous other developing universities across the globe. These leaders failed to

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understand what they had and dismantled a reputable, experienced, and proven provider of excellence. This system has never recovered nor attained its prior glory.

All these examples point in one direction – ineffective leadership usually due to poor decision making embedded in the wrong decisions at the wrong time for the wrong reasons. In all instances, the concept of a well thought-out change strategy was absent. The decisions were capricious and arbitrary. All resulted in failures – failures for the institutions – and failures in leadership.

A progressive model for leading change

Kotter's (2012; p.23) eight steps of effective change provides a roadmap for examining the process of change management in an ODL enterprise. The following provides an abbreviated oversight of the process. Let's examine these from the ODL leader's perspective.

1. Establishing a sense of urgency

- Examining the market and competitive realities;
- Identifying and discussing crises, potential crises, or major opportunities;
- Having a sound understanding of emerging and developing market trends.

Creating a sense of panic is not synonymous with creating a sense of urgency. The rapid changes is digital technologies have resulted in many ODL leaders confusing panic with urgency. The good ODL leader recognizes that an effective change strategy still takes time to plan, implement, and adapt. This first step cannot be separated from vision making in step three. What it does require is for the leader to understand the competitive capacity of his/her institution to enter new markets, maintain existing customers, and see the forest from the trees in identifying market opportunities. It means doing one's homework and research. It means making the right decisions at the right time for the right reasons.

2. Creating the guiding coalition

- Bringing key stakeholder representatives on board;
- Empowering the group to lead the change;
- Getting the group to work together like a team.

ODL leaders are conditioned by the very nature of the university enterprise: Appoint a strategic planning team, (usually of executive institutional leaders), produce a plan, send it out for input from institutional stakeholders (faculty, staff, students, partners, etc.), then ignore certain aspects of the feedback and put the plan into action. The problem is that the plan is developed with no contingencies for leading change. The team presumes – incorrectly – that creating the plan is the same as a change strategy to ensure the plan is implemented successfully. Are we really surprised that so many strategic plans gather dust on the shelves in glossy covers and drift in to oblivion? The Guiding Coalition is not about senior positions in the institution – it is about bringing together people who represent the interests of all stakeholder groups of the institution and who have the power and project management skills

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to realize and formalize the change (Berge, 2001). This group does the vision making, not revision making, which will be discussed below.

3. Developing a vision and strategy

- Creating a vision to help direct the change effort;
- Aligning vision and strategy with organizational culture;
- Developing strategies for achieving that vision and validating with stakeholders.

Vison making is aspiring to an ideal state of affairs for the institution 3-5 years in the future – 2020 for example (Hickman, 2010; Yukl, 2013). It is not the same as a mission statement, which describes what an institution does day in and day out. A vision is about what the institution will be to thrive, not just survive, in the long-term. A viable change strategy requires and underpins the achievement of this long-term vision. The change strategy is useless if you don't know where you are going. If you don't know where you are going, it doesn't matter which road you take. This is a reality check – the right roads lead to reaching the aspiring vision of the ODL university in 2020.

4. Communicating the change vision

- Using every vehicle possible to constantly communicate the new vision and strategies;
- Having the guiding coalition model the behaviour expected of employees;
- Keeping communication open, continuous, and transparent.

Like the strategic plan, a vision statement often has a major unveiling and then it is forgotten. Leaders must communicate this vision consistently, often, and with the reasons why this is the right vision for the right reasons for our future (Kotter, 2012; Hickman, 2010; Yukl, 2013). And, the guiding coalition has equal responsibility for communicating the vision – this is simply not just the Vice Chancellor or President's job. If institutional leadership is not singing the future vision in harmony, it will not happen.

5. Empowering broad-based action

- Cross-checking across operational processes and strategic plans;
- Changing systems or structures that undermine the change vision;
- Encouraging risk taking and non-traditional ideas, activities, and actions.

Leaders must make many hard decisions – it comes with the job. Whether there are organisational barriers or senior staff who play the devil's advocates against everything, the visionary leader surround himself/herself with people who are aboard the vision train. Those who are not must be either convinced the vision is right or the leader must re-vamp the guiding coalition. Ask any ODL leader this question: Are you surrounded by the right people in your leadership team? Most don't know the answer because some senior people have been inherited or the leader won't ask the question in the first instance. A primary responsibility of effective leaders for leading change is establishing a strong leadership team of key people to communicate and realize the vision. Organisational structures that impede rather than

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leverage new opportunities and innovative thinking must be removed. Modifying these incrementally will not work. What happens is the structures end up looking just like they did before. What goes around stays around. In addition, there should be an ongoing cross-check across operational processes and strategic plans in order to help ensure sustainability of the vision and formalization of change (Berge, 2001; Bates & Sangra, 2011).

6. Generating short-term wins with the long-term in mind

- Planning for visible improvements in performance, or *wins*;
- Creating those wins;
- Visibly recognizing and rewarding people who made the wins possible.

We all can learn a valuable leadership lesson from psychology. Intermittent reinforcement tends to work more effectively than either little or excessive reinforcement. What does this mean? It actually means setting high expectations that lead to a targeted positive result for a specific component of the change strategy. Colleagues will feel they have accomplished something valuable towards the long-term vision. Morale will be sustained and demonstrated results are contagious. Future results will be more attainable and people will commit to the work and effort needed to make these come to fruition. Leadership breeds leadership. And, when these short-term wins are accomplished, the Guiding Coalition gives credit to everyone else as the price of leadership. Letting subordinates across the institution get the credit – and the guiding coalition celebrates the process and gains.

7. Consolidating gains and producing more change

- Using increased credibility to change all systems, structures, and policies that don't fit together and don't fit the transformation vision;
- Hiring, promoting, and developing people who can implement the change vision;
- Reinvigorating the process with new projects, themes, and change agents.

We have heard it before. The only constant is change itself. Thriving organisations in 2020 will see leading change and planning as continuous and adaptable AND will even engage in contingency planning to increase organisation adaptability for those unforeseen changes in the markets, economy or even political changes from government agencies (Kotter, 2012; Hickman, 2010; Yukl, 2013). Leading effective change means building success upon success. The most effective and thriving organisations engage in more contingency planning and change strategies when the organisation is doing the best. This is proactive and unfortunately most ODL leaders and higher education leaders engage in contingency planning and leading change when things are at their low point. This is reactive and panic-drive and is usually unsuccessful in the long-term.

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8. Anchoring new approaches in the culture

- Creating better performance through customer-and productivity-oriented behaviour, more and better leadership, and more effective management;
- Articulating the connections between new behaviours and organizational success;
- Developing means to ensure leadership development and succession.

The change strategies that got you there in the first place don't automatically become part of the organizational culture by osmosis. In fact, even if the strategies are highly effective, they will tend to be thrown away easily unless the leaders constantly return to these when the winds of change challenge the strategy. The one sure metric of whether your change strategy has been embedded in the organizational culture is if the tenets that drove the strategy are fundamental to decision-making across the organization. The CEO's vision and strategy for leading change was developed based on consensus – agreement of the vision and key elements to make the vision a reality. If these can be discarded at the first sight of trouble, then the new approaches have not been anchored in the culture and will not be sustainable (Hickman, 2010; Yukl, 2013).

Summary

Leading change and digital transformation takes more than technology. It will require a rediscovery of a new leadership and putting innovation back into the core of each leader. Building a community for innovation requires a synergy of the entire community – educators, government and ministry leaders, students, faculty, private providers, social service organizations, religious leaders, parents, and more. Indeed, what we should be developing are 'communities for innovation' that collectively embrace innovation in all its guises and creative capacities (Olcott, 2014; Rogers, 2003). Returning to Kotter's change model, innovation is inherent in all eight steps. We want to encourage, nurture and reward innovation and creativity. Leadership is at the crossroads. We will stay there in open and distance learning unless we begin to think differently about how we think about vision making and leading change.

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OPENING STUDIES THROUGH VIRTUAL EXCHANGE – CASE DESCRIPTION

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Introduction

Openness brings challenges for traditional universities in their practice implementation. The aim of virtual exchange is to reach academic goals, also sharing and gaining from socio-cultural experience. Teacher collaboration for joint course design and/or delivery and recognition of student and teacher virtual exchange are the main challenges European universities face in organizing virtual exchange. The aim of this paper is to present how universities may open (their practise) by collaboration of teachers in creation and use of OER, in development of study modules for virtual exchange, and by joint student activities in virtual exchange. The described case has been implemented and financed under Erasmus+ Strategic partnership project OUVM – Opening universities for virtual mobility (project No. 2014-1-LT01-KA203-000550).

Virtual exchange characteristics and possibilities

Virtual learning activities and physical mobility of students and teachers is a common practice at European universities, however virtual exchange (or virtual mobility) is a challenge and a new practice for most of them. 2011 Eurostudent report (Olivos Rossini, Rincon, & Rutkowski, 2015, p.138) indicated five main reasons why the students would not study abroad:

> *"Financial insecurities (57%); insufficient support of mobility in the home country (49%); lack of individual motivation (48%); insufficient support of mobility in the host country (24%); and lack of language competence (23%)."*

The main indicated issues such as financial insecurity, insufficient support of mobility in home or host country are overcome in virtual exchange case, as most issues regarding support are solved before the exchange, while no need to travel creates no financial insecurities. Virtual exchange also provides a possibility to develop intercultural competences while staying at home for those students who would not be able to travel due to family, work or other reasons. Vasilevska (2014) indicates the following advantages of virtual exchange regarding physical mobility:

> *"no need to change your usual lifestyle; minimal financial investments <…>; gaining of the international learning experience <…>; the availability of education at any stage of life that today is particularly topical within the framework of Lifelong learning program."*

Virtual exchange (sometimes referred as virtual mobility) in higher education is an activity of learning, teaching, research, communication, or collaboration, characterized by the following features:

- Development of intercultural competence;
- Cooperation of higher education institutions;
- Application of appropriate technological solutions for learning and teaching;
- Aimed at achieving academic goals and recognition of the achieved learning outcomes.

Vasilevska (2014) characterises virtual exchange indicating the following criterion: individual accessibility, more personalized educational offer, increased flexibility, interactive materials used, and working in team. Researchers (Op de Beeck, Bijnens, Michielsens, & Van Petegem, 2007; Op de Beeck & Van Petegem, 2012; Caldirola, Fuente, Aquilina, Gutiérrez, & Ferreira, 2014) define the most common examples of virtual exchange activities as follows: it may be a virtual course delivered in another university, a joint course delivery of several universities for both universities' students, virtual group activities of different countries' students, virtual seminar or series of the virtual seminars, virtual practice or internship implemented at the company abroad, virtual activities to support physical mobility.

Virtual exchange case description

Main issues of opening universities for virtual exchange

Openness is a challenge for higher education, as it requires revision of their practices, training for teachers and students on OER creation, use and reuse, and synergy of these processes to market institution activities online. Virtual exchange should be seen as a regular form of study exchange and internationalization, however teachers should be able to design curriculum for virtual mobility, students should be able to participate in international online studies, and institutions should be ready to recognize international virtual exchange in study programmes.

Openness as an innovation should be integrated into an organization through all areas of its activities (Volungeviciene, Tereseviciene, & Tait, 2014):

1. Strategy and management;
2. Infrastructure;
3. Curriculum designing;
4. Teacher and academic staff training;
5. Support system;

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6. Quality assurance;
7. Marketing, business and communication.

The aim of the OUVM project is to open university studies for virtual exchange by training teachers and academic staff on how to design MA program curriculum using OER and applying correct licensing; how to establish collaborative trusted relationships in curriculum designing for multicultural exchange; and how to integrate these open education innovations in every day practices. OUVM project training and virtual exchange implementation have directly addressed all 7 areas of university activities, by revising virtual exchange procedures at participating universities, creating platform for virtual exchange courses and their marketing, training teachers and support staff specialists on virtual exchange curriculum design process and peculiarities, and implementing peer review of virtual exchange courses for quality assurance.

The partnership of the project is conducted of 5 universities engaged in following project activities:

- Vytautas Magnus University (VMU) – coordinating project activities, organizing teacher trainings on curriculum design and study process administration for virtual exchange, creating platform for virtual mobility courses and their marketing, preparing study modules for virtual exchange, and opening study process for virtual exchange;
- Katholieke Universiteit Leuven (KUL) – organizing teacher trainings on curriculum design for virtual exchange, and peer review of study modules, prepared for virtual exchange;
- Universita Degli Studi di Pavia (UNIPV) – preparing study modules for virtual exchange, and opening study process for virtual exchange;
- Universidad de Oviedo (UNIOVI) – organizing teacher trainings on open educational resources and curriculum licensing; preparing study modules for virtual exchange, and opening study process for virtual exchange;
- Universidade Aberta (UAb) – organizing teacher trainings on open educational resources and curriculum licensing; preparing study modules for virtual exchange, and opening study process for virtual exchange.

Teacher collaboration for virtual mobility curriculum design

Teacher collaboration for joint course design

Teacher collaboration may be fruitful for teachers and students, however there are not many cases that include inter-institutional teacher collaboration for a course delivery and design. Tsai (2001) stresses the need for teacher collaboration using technologies in web-based instructional activities, however there is no much research focusing the need for teacher collaboration and techniques in online learning.

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When opening universities for international virtual exchange of students, the team of institutions that cooperate and agree upon common procedure is crucial. However teacher openness and collaboration for virtual exchange on joint curriculum design and/or delivery is also of high importance. The main aim of this curriculum is to achieve learning outcomes of the course, but collaboration between different institution teachers for course design or delivery bring intercultural setting and make the courses unique.

Joint course design and delivery is a possibility for teachers to collaborate, share their common practices, and learn from different colleague background, access to resources, and cultural approach. It sometimes is a challenge for teachers who tend to work alone in their course design and/or delivery, as they do not feel well opening their course for others due to various reasons. Thus this collaboration requires openness, professional confidence, trust and tolerance from engaged teachers. Lee, Poch, Shaw and Williams (2012) stress that

> *"engaging diversity in the classroom is not a natural or inevitable process, and does not result merely from the presence of diverse social identity groups or course content" (p.8).*

Thus teachers need trainings on virtual exchange course and/or activity design peculiarities, course adaptation, student engagement in international teams, and getting use of the additional value in the course which comes from intercultural student background and collaboration. Teachers also have to have skills on creation, use and re-use of open educational resources in their courses. 3 training materials for teachers on *Virtual mobility curriculum design*, *Open educational resources*, and *Creative commons licenses* have been created and used for teacher trainings during OUVM project; the training materials are publicly available at openstudies.eu portal section *For Teachers*.

The following courses of master programmes were selected for joint course design and/or delivery in OUVM project:

Table 1: Teacher collaboration in course design and delivery for virtual exchange

Course leading university	Master courses adapted for virtual exchange	Course collaborating universities and no of courses for collaboration	Teacher collaboration in the no of courses
Universidade Aberta (UAb)	3	UNIOVI & UNIPV – 1 VMU – 2	Course design – 3 Course delivery – 2
University of Oviedo (UNIOVI)	2	UNIVP & UAb – 1 VMU – 2	Course design – 3 Course delivery – 1
University of Pavia (UNIPV)	2	VMU – 1	Course design – 1
Vytautas Magnus University (VMU)	4	UNIOVI – 2 UAb – 1 UNIPV – 2	Course design – 4

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To prepare and open some part of the course before its delivery is necessary for all courses, selected for virtual exchange. All the courses, suggested for virtual exchange in OUVM project, have their introductory parts open and available online for students at the openstudies.eu portal (see Figure 1).

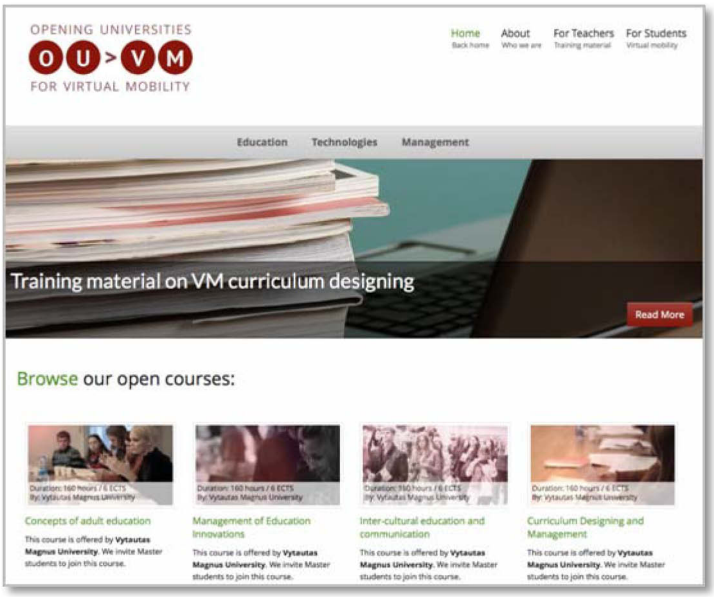

Figure 1. OUVM home page with courses for master virtual exchange

It is crucial for students from different universities to have the possibility to see publicly online the course presentation, learning outcomes, topics, planned activities and assessment strategy when they are choosing the course for virtual exchange.

This publicly available introductory part of each course constitutes of short course presenting video and course description information, which includes: delivering university, course timeline and duration, prerequisites to attend the course and target group, course delivery language, teaching, learning and assessment methods, and short description of teachers.

Student virtual exchange

Preparation for student virtual exchange

There are several steps student need to implement before virtual exchange – choose the subject, apply for virtual exchange, be nominated for virtual exchange, sign learning agreement and send it together with the necessary documents for course hosting university. The openstudies.eu portal presents and guides students within these steps (see Figure 2).

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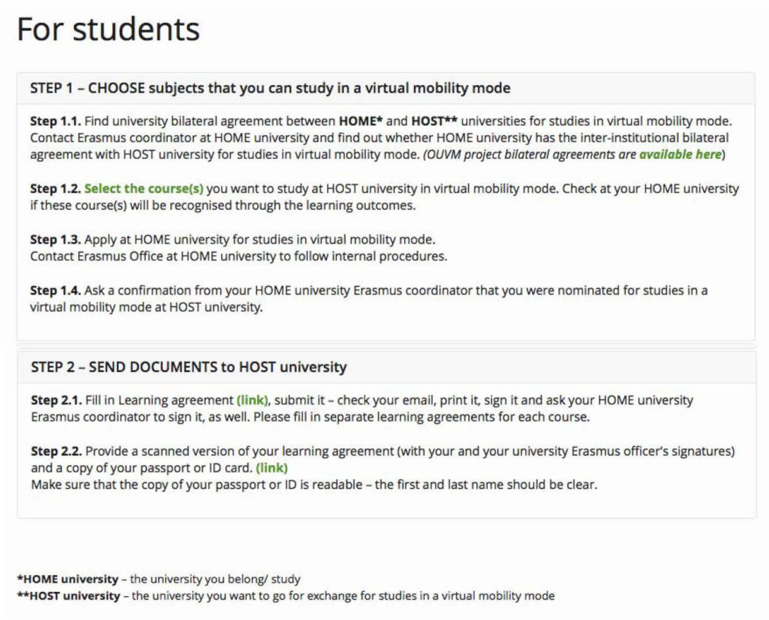

Figure 2. Openstudies.eu portal – Register for virtual mobility section for students

The openstudies.eu portal aims at presenting and marketing all the necessary information about virtual exchange courses for students before they start the learning process. The home page of the portal presents the courses that students can select for virtual exchange (see Figure 1).

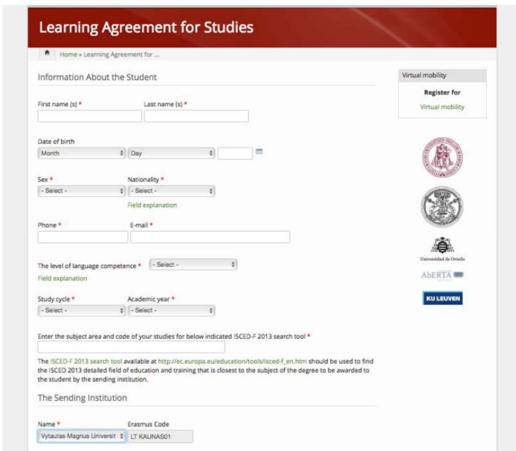

Figure 3. Openstudies.eu portal – Register for virtual mobility section for students

The main document that student signs with home and host universities before virtual exchange is the learning agreement (See Figure 3).

Openstudies.eu portal provides students with the possibility to fill in this learning agreement online. It is programmed in such way that students fill in their personal data, chose sending and receiving universities and their courses and receive the pre-filled in document to their email. After printing, signing and contacting the university representative to sign, students may upload it together with necessary documents online, where the host university office for virtual exchange receives them. This online learning agreement signing process help students

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easily fill it in as the constant data (such as university address, representing persons, course codes, etc.) are filled in automatically when the students choose University and the course.

International student exchange during virtual course

The additional value here comes from intercultural setting. The more different students attend the course, the more value they may bring to the course. The international group work activities in this virtual course delivery are the main intercultural resource, as the students and teachers from different cultural setting bring their own culture background and perspective to enrich the course.

Practice shows that it is always difficult to engage a number of students for virtual exchange in order it were possible to organize these joint virtual international group activities. Teachers need course adaptations in the cases where the course students are from one or two nationalities, or the number of one nationality students dominates the course. However even in the case where one nationality students participate in the course of different country, cultural background and intercultural communication developed. Curriculum content, enriched with socio-cultural activities, and different learning methods chosen by course delivering teacher plays the main role in intercultural competence development.

Challenges of virtual exchange

Organization of virtual exchange of students is a challenging and new process in higher education institutions. The common procedures of physical mobility or Erasmus mobility are used as the basics for virtual exchange organization, but they cannot be duplicated. Student is not physically coming to the traditional universities, which are used to have foreign students present, so some challenges are faced by student sending and student receiving university. Student sending university has to take more responsibilities in organizing the selection of students, providing students with the information on the virtual courses abroad, informing the receiving institution on the virtually incoming students and their contact data, organizing the signing of learning agreements process, informing the students on virtual studies peculiarities, etc. Student receiving institution also has to perform some additional activities as the student being not present at the university and cannot bring the documents to necessary departments or fill in necessary forms handed in – this has to be done online, with the online forms ready, and taking more time to reach the students and communicate with them online. Thus this virtual administration brings challenges for several departments, regardless if there is one or ten students coming for virtual exchange.

Also the receiving university has to have the online support system ready with online guidelines, manuals and/or virtual trainings for virtually incoming students on the virtual learning platform and/or other tools to be used for virtual course participation. Students need to find these support activities and contacts as soon as the study process at student home university starts, as not going abroad it is much easier to change your mind and drop the possibility due to the lack of information.

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One more challenge for students and receiving universities is different semester starting dates. Students don't go physically abroad and tend to keep up with his/her home university semester dates to finalize administrative issues and start learning. It is really challenging for course teachers to integrate the latecomers.

Teachers collaborating in the course for virtual exchange design faced some challenges due to different experience and different experience in online learning, different quality assurance requirements for studies in partner institutions, different scenarios of contact hours, different understanding of collaboration, lack of time for coherent course design, different opinions and point of view, etc.

Conclusions

1. Opening university practices via teacher collaboration and student virtual exchange is a challenging process where technologies create possibilities and facilitate administrative processes, however coherent preparation and coordination of activities is needed. Erasmus+ funded projects create possibilities for teachers to collaborate in course design and delivery for virtual exchange, for students to study virtually abroad, and for institutions to prepare and validate necessary procedures for virtual exchange implementation and recognition.
2. Virtual exchange case implementation revealed the main challenges for teachers, students and universities:
   - Students: in selection and registration for virtual exchange at university abroad;
   - Teachers: collaboration for joint course design and different time of students, joining the course;
   - Universities: in recognition of student and teacher virtual exchange.

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ADVANTAGES AND DISADVANTAGES OF SPOCS (SMALL PRIVATE ONLINE COURSES): EXPERIENCES WITH ONLINE LEARNING

Gerard Gielen, UC Leuven Limburg, Belgium

What are SPOCs?

A Small Private Online Course (SPOC) refers to a version of a MOOC (Massive Open Online Course) used locally with on-campus students. University of California Berkeley Professor Armando Fox coined the word in 2013 to refer to a localized instance of a MOOC course that was in use in a business-to-business context. If MOOCs are used as a supplement to classroom teaching rather than being viewed a replacement for it, they can increase instructor leverage, student throughput, student mastery, and student engagement. SPOC's are online courses that are still free and delivered through the internet, but access is restricted to much smaller numbers, not more than tens or hundreds of students, rather than tens of thousands. Access is restricted to the student groups you are teaching to.

Some SPOCs are meant to support life teaching courses, others are made to replace the reality courses, e.g. for students who are studying abroad (practices) or have to combine work with studies (and can't follow the real courses) or demands more flexible learning pads. In a SPOC as in a MOOC students typically access interactive content at their own pace. The significance of SPOCs is that online learning is now moving beyond trying to replicate classroom courses and is trying to produce something that is more flexible and more effective. SPOCs are typically closed and limited enrolment (for example, limited to the students participating in the corresponding campus course), whereas MOOCs are open enrolment for everyone. SPOCs are online courses taught and assessed by real people mediated by the computer; not just programmed into the computer.

SPOCs support blended learning and flipped classroom learning, which variously combine online resources and technology with personal engagement between faculty and students.

When a SPOC is implemented at an institution, faculty determines which features and course content to utilize. This can include video lectures (educasts), assessments (with immediate feedback), interactive labs (with immediate feedback) and discussion forums. Using MOOC technology in SPOC's allows the faculty to organize their time with students in more different ways.

Implementation in the university college

I worked out a SPOC for my second year students of bachelor social educator at the UCLL (University College Leuven Limburg) for the course *Management and policy of institutions* (in Dutch language). Because of their practice, student only come to the university for two days a week, but some do their practice abroad or have to do specific jobs or have to join meetings in their practice places during the lessons days. For that reason the course 'Management and policy of institutions' is organized on two ways. Students who prefer to come to lessons, can do this once a week on the fixed schedule time. They follow 10 hearing colleges of 2 hours in large auditorium groups. Other can follow the same courses through an online learning platform in SPOCs.

Development for what reasons?

Student who can't join the real courses because of their practice or by motivational problems (there is also an active student life in the evenings) can follow the same course online through a Blackboard course (Toledo variant). Students have a hard copy of the course text (about 350 pages).

In this online course there is a fixed structure: the course is divided in two large topics and each topic is divided in several different themes (=modules).

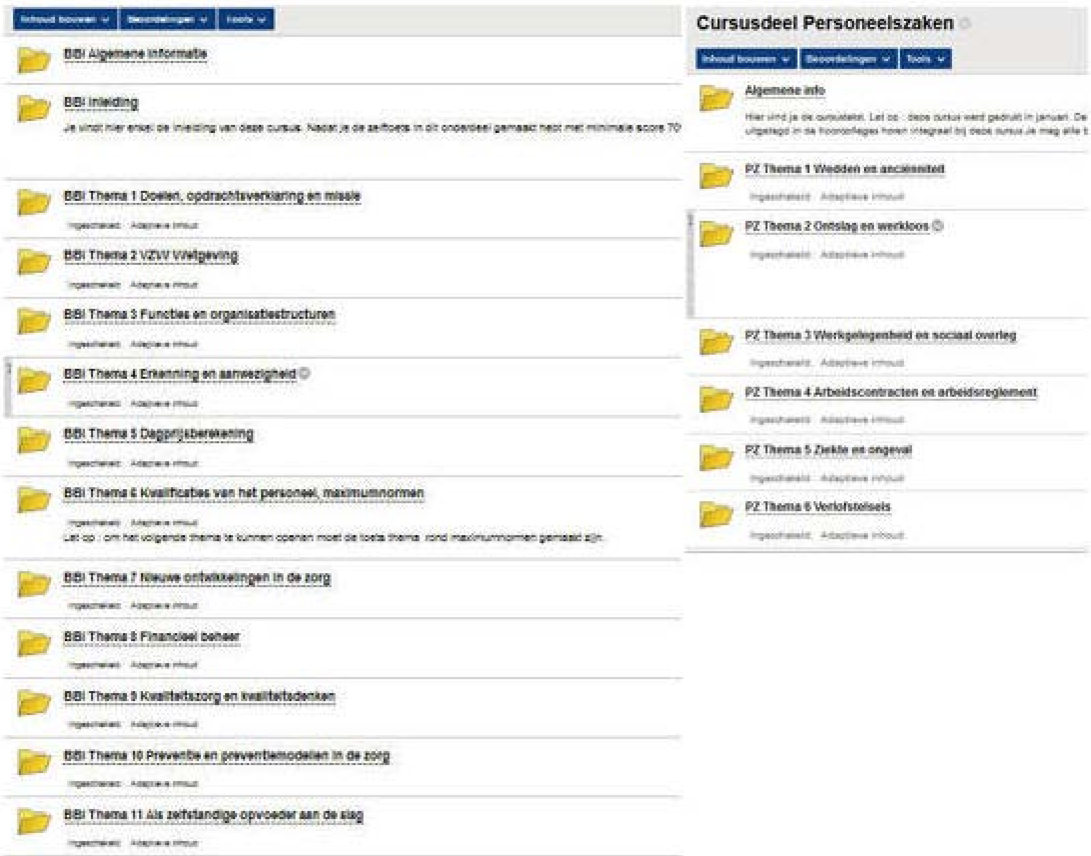

Figure 3. Topics and themes of the SPOC course

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Each theme start with objectives (goals to achieve), guidelines for independent studying, the PowerPoint of the theme, extra useful information, an educast of the content (this means a video where the lecturer makes comments to the PowerPoint and the course text, like in the real lesson), an online self-correcting test. Students have to achieve 70% of the online multiple choice test in each theme and in that case the next theme opens on the computer. The student can make the test as many times he likes, until he receives the minimal level of 70% correct answers.

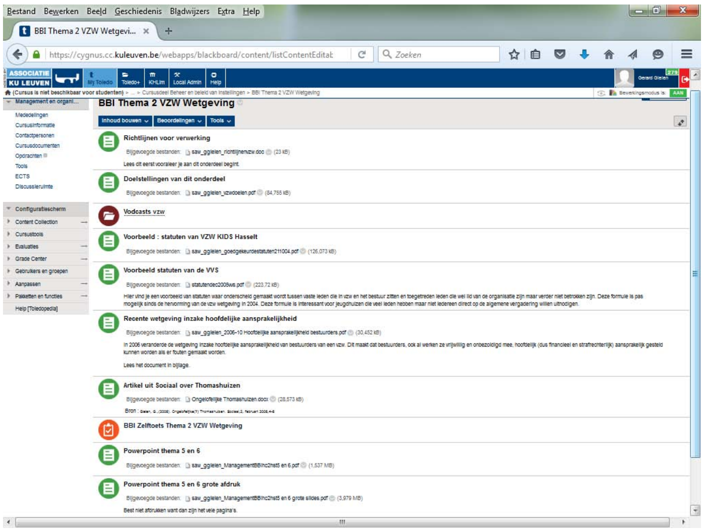

Figure 4. Structure of a theme in the SPOC

It is a private course: students have to login with their own student identity and the lecturer has to give permission to the student to follow this online course. The learning happens in a close environment, only available for the registered students.

There is also an online forum (discussion board) in the course for each of the two topics where the student can ask questions to the lecturer or to other students. The lecturer and students who have subscribed to the forum get an email message when someone has post a question or remark and when the lecturer or other students have answered. So they don't have to check every time for new posts.

The educasts (video capturing of the PowerPoints and course text) are made with Camtasia on a computer. The lecturer recorded small online courses for max 15 minutes and explained everything on the same way he explained in the real life colleges. The video only shows the PowerPoint or the course text, no image of the lecturer himself. Research with the two methods learned that students didn't like the lecturers face at the top of the screen. They told that is was disturbing the attention, but maybe they didn't like the face at all.

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Advantages and disadvantages of SPOCs: my own experiences

Advantages

- An advantage of e-learning by SPOCS is likely that the curriculum can be offered in a more varied way with video, extra information, examples, links to websites, etc.. This makes the material easier to be absorbed and makes learning more interesting for students. The course is divided in small short limited themes (modules) so the student can learn more progressive and step by step and can register his own progress.
- Learners have 24 hours and seven days a week access to the learning environment. They don't have to move anymore to the university and can study at home (or abroad as Erasmus student). SPOC students appreciate the way of teaching because it makes their learning more flexible. They can do a job during daytime and study in the evening, or can be present at their practice places when they are needed for meetings or urgent interventions. They can start later in the year with the course and even follow all the lessons with all the explanations at their own pace.
- SPOC students can participate individual in feedback dialogues with the lecturer and other students through the discussion board; they can ask questions and get online answers and they can participate in activities that are facilitated by real people. Some students do not dare to ask questions in large auditorium college groups (more than 100 students together) and prefer to ask more anonymous through the learning platform.
- SPOC students can test their knowledge through the online questionnaires. It is an extra motivational point that they can go to another theme after succeeding the 70% minimum of the test. You can compare it with gaming. Reaching a specific goal means they can go another (higher) level.
- Also the lecturer can follow the progress of the SPOC student, he sees when the students have logged in, how many hours they spent to the course, which level the student reached, etc.
- The final exams happens on the same way as the online tests. Students have to fill in 40 multiple choice questions like the online tests. So the SPOC student is well prepared for the final way of examination because of the same way of testing during the training period.
- The knowledge acquired by the specialized lecturer, is not lost (when he leaves the organization) and can be taken over by colleagues. If the lecturer can't teach for some reason f.i. by participating in seminars or due to illness or other university duties, the student can still continue with the online course.

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Disadvantages

- Personal contact with the students is missing for the lecturer. Especially the educasts are difficult to make and are impersonal if you don't see students before you. You can't explain everything on the same way as in real classes because you haven't any feedback on the things you tell. I found a solution for this problem by making notes of all the questions and remarks during the real lessons and tried to integrate them in the online educast but it still keeps anonymous.
- During real courses students can immediately ask questions and get direct feedback. This is not the case through the online course: it takes some time before the lecturer can answer in the discussion board and it is more difficult to answer with a written text than with life spoken words. Although direct feedback in my case is also relative. I have to teach during hearing lectures in a large auditorium to a group of about 100 students. So the threshold to ask questions in this large group is also very high. In reality during these hearing lectures there is also less interactivity. I noticed that students who follow the real lessons preferred to ask questions in the discussion board too.
- The tests are self-correcting. But the items of the tests have explicit no feedback information. The students can make the tests as often as they like, but when there should be feedback information on each question, the challenge to find the correct answers themselves is left undone. But this hampers a correct learning process.
- I noticed by analyzing the learning process of some students that they use sometimes trial and error in making the tests. They make the test once by guessing and write down correct and wrong answers. They do the test again, and again, without thinking until they have all the correct answers to go further in the course. Students are also clever in exchanging of information: they share answers of the questions on Facebook. For this reason I offer the tests each time with questions in arbitrary sequence and also within the questions with the items arbitrary offered. But stimulating self-learning as goal isn't always reachable and is often only a wish from the lecturer.
- A student should possess ICT skills. This means he should be able to get along with internet anyway and have good and fast internet access. During the years I worked with the SPOCs I met several technical problems with the learning environment: tests didn't work properly or not, students were blocked in the system for unknown reasons, etc. This hampers the enthusiasm of the lecturer and students.
- Motivational problems. E-learning requires heavy demands on the self-discipline of the students. In other words, it requires a high commitment and good motivation. I noticed lot of postponement behavior. This means that students who don't follow the real lessons, start very lately with the online course. Some students only start the online

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course some weeks/days before the exam period. So the wonderful idea of self motivated students who learn flexible and independent at their own pace is for lots of unmotivated students an utopian dream. For this reason I had to put final goals dates in the course. If they succeed in a specific number of themes (making the online tests and go further with new themes) before a certain date they can earn already some points for the final exams. Because I didn't make a difference between kinds of students, the students who follow the live lessons also have to make the online tests before the goals dates.

- Developing quality online courses is still labour-intensive. Before the SPOCs I had two large auditorium groups of each 110 students. Now with the SPOCs there is only one teaching group. It took persuasion to convince the management that an online course also asked time commitment of the teacher even though the teacher itself no longer attends school. Teaching jobs at the university are often calculated in real contact time and the management forget that even after an online course is finished there is also much time needed for online interaction with students.
- It takes a lot of time for the lecturer to create online courses and if anything changes in the material within a previously recorded educast, that educast should be re-recorded and also the online tests need to be adjusted, which is not always easy for technical reason as a student already has made some tests.
- Learning is a social process in which interaction, communication and collaboration plays a crucial role in knowledge acquisition and development of learners. It is also important that learning takes place in a relevant, complex and flexible, authentic setting. Through online learning students are missing this life social network, personal contacts and the peer pressure to study and work motivated for the courses.
- It is not possible to reach all the learning objectives with e-learning. This means that it contains most of time lower thinking level knowledge like facts and concepts and less productive skills like application, analysis, creating,…(cfr Taxonomy of Romiszowski) Criticism, creativity, etc is less stimulated during this online courses. It could be possible to have them make online discussion and reflection tasks, but with a group of more than 200 students, this is impossible to correct. In smaller groups this is absolutely necessary.

Conclusion

Working with SPOCs is an interesting way to let students learn flexible. The quality and cost of the courses has not to be so high because the information is only made available for a small limited group of students. It is not intended to reach a large mass of students but works as an additional tool to provide your students flexible learning.

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It is contemporary and has a good answer to questions about flexibility, student friendliness, and modern learning. For motivated and committed students this is a way of stimulating them to powerful learning. But if you want to work with it you have to consider a number of essential conditions. SPOCs have advantages and disadvantages. From my experiences I would never force students to choose one or the other way, but offer both learning systems side by side so that the student can learn in the most appropriate way for himself.

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EDUCATIONAL SYSTEM INTEROPERABILITY – CHALLENGES FOR OPEN LEARNING AND TRAINING PROGRAMS

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Open innovation and open education

Information, knowledge, and competencies are the key driver for the further development in each area of society. Intellectual and knowledge based capital has important influence of investments, innovation and growth in economies (OECD, 2013; p7ff). Especially, the knowledge and intellectual resources are becoming increasingly important regarding the transition to information society focused on the digital transformation because information and knowledge will be made available regardless of time and space. Digital learners and coaches are required for the digital society.

Innovation is one of the most essential driving forces behind competiveness and changes. Competiveness means superior growth and performance of system in general. The individualization by the citizens geared to the target group orientation as well as the competitive constrains generated by the increasing globalization and deregulation of the key sectors force the urgency and pace for innovations today. Innovators as professionals are the source for the innovations needed in all sectors of the society for solving the challenges of the future. Innovation based on the generation of new knowledge as the result of organizational and individual learning processes. But, knowledge has to be shared to be able to create new knowledge and to lead to innovations. The higher the intellectual capital is developed, the better it acts as a catalyst for knowledge sharing and innovation (Saenz, Aramburu, & Rivera, 2010).

Innovation is a term in economics for improvements accompanied by technical, social and economic changes. All attempts to define the term are characterized by (a) Novelty or replacement at least one object or social action for the system under consideration; (b) Modifications or changes by the innovation in and by the organization, i.e. innovations needs to be discovered, invented, introduced, used, applied and institutionalized (Gabler Wirtschaftslexikon, n.d.). Because knowledge and information are goods that are difficult to control and aspire for open use, the public and private guardians of competitiveness usually tend to an artificial shortage. Such strategies of scarcity are counterproductive for innovation per se. The constructive alternative is to use innovation and creativity, particularly in relation to knowledge as well as to the possibility of being able to freely access information products that represent knowledge (Kuhlen, 2006).

Open innovation provides as an adaptation the approaches developed in the open as well as free software and open access principles for free use of information and knowledge products. Open innovation becomes part of the open society including free movement of people and other resources supplemented by the openness of knowledge sharing and education. Therefore, investments in organizational change and the creation of open educational resources should be realized in the context of the digital society based on digital infrastructure, devices and competencies as well as high quality educational software. Open and innovative education and training reflect aspects such as innovative and active pedagogies, participatory education governance, synergies between education, research and innovation, ICT as driver of the systemic change, open and digital resources, digital skills and competencies at all levels of learning (European Commission, 2015).

Openness for learning and training programs

Open education requires the willingness of the owners of information and knowledge to make the resources available for use by demanders. There are different forms of motivations to push open solutions of education and training. The spread ranges from the socially competent individualist via the public organization up to the commercial supplier. The reasons depend on the specific target systems including especially strategy, structure and information technology for the open educational approach (Rivard, & Aubert, 2004). But, if the decision for opening the accesses to the own information and knowledge resources was made, a variety of possible relations for the knowledge transfer will be available as single- or multi-channel support services.

The kind of openness is influenced by primary as well as secondary and tertiary aspects. The primary hard facts are volume, time and costs for the knowledge transfer supplemented by the form, technology and structure for the provision and completed by framework conditions of policy, culture and regulations. (Figure 1)

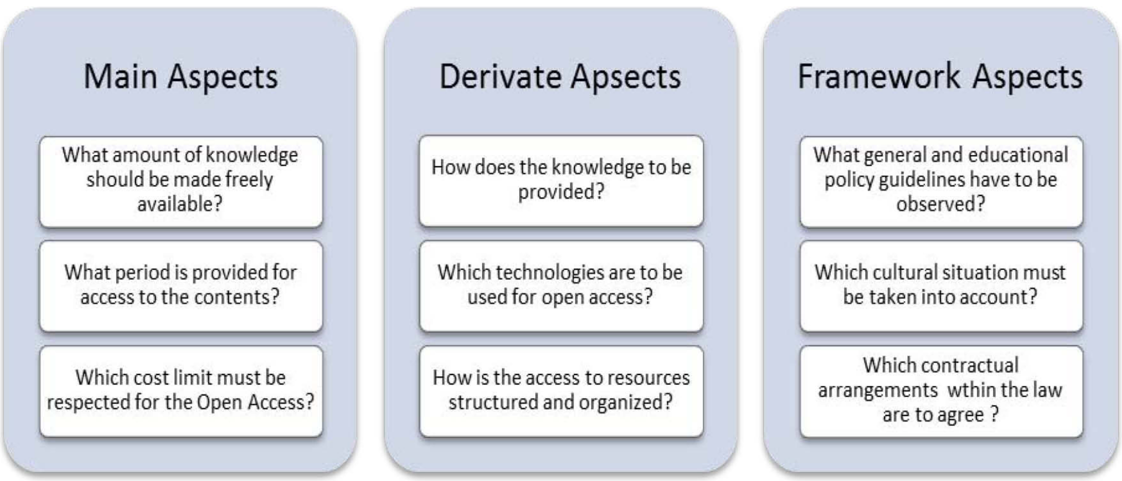

Figure 5. Influences for openness of education and training

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The opening of the knowledge base can be carried out at different levels: statement, sequence, module, course or program. It is necessary to define which elements are from what level made freely available. In addition, it must be decided whether the elements will be single used or linked due to their context. Usually, several elements are interdependent and form an educational program of any length. The prior art is to integrate these elements in the program.

Interoperability and integration in education

The pure doctrine of the past was to integrate functions, processes or systems for using different applications in one extended functional context based on several subcomponents. The learning platform of the first party provider was combined with the content development system of the second party provider and with the document management system of the third party provider and so on. The subsystems will be connected by defined and fixed interfaces. If the interfaces are standardized, each component will be able to use the same interface. Otherwise, the interfaces are unique for the one or few integrated solutions. The result is that the users buy common solutions ready-made. The only way for including flexibility and application-specifics is the customizing approach taking in account that the systems become larger and more cumbersome.

The same problem with integration of different systems, subsystems and components is generated by using several teaching and learning concepts, methods, programs, modules etc. in the level above. The components of various educational providers have to be integrated by defined interfaces. Otherwise, redundancies and inconsistencies are threatening whereby the learning processes are hampered or disturbed in further consequence. The state of the art is today, that one or several educational providers offer integrated programs. (Figure 2)

The interfaces have to be regularly adjusted if the structure of the content of one of the provider will be changed. If a third party provider would be added, he would have to take over unchanged interfaces or interfaces would have to be adjusted again. Nowadays, an alternative is offered by interoperability concerning primarily interconnection of systems but also the interaction of the components. Interoperability between different objects such as platforms or knowledge bases allows the connection and communication of different components based on their own flexibility, smartness and universality instead of only fixed interfaces. In addition, it increases the value of applications for users by facilitating access to wide ranges of functions and content, too. Interoperability increases attractiveness of the applications for the consumers and generates new incentives of the providers to co-operate (OECD, 2013; p.50).

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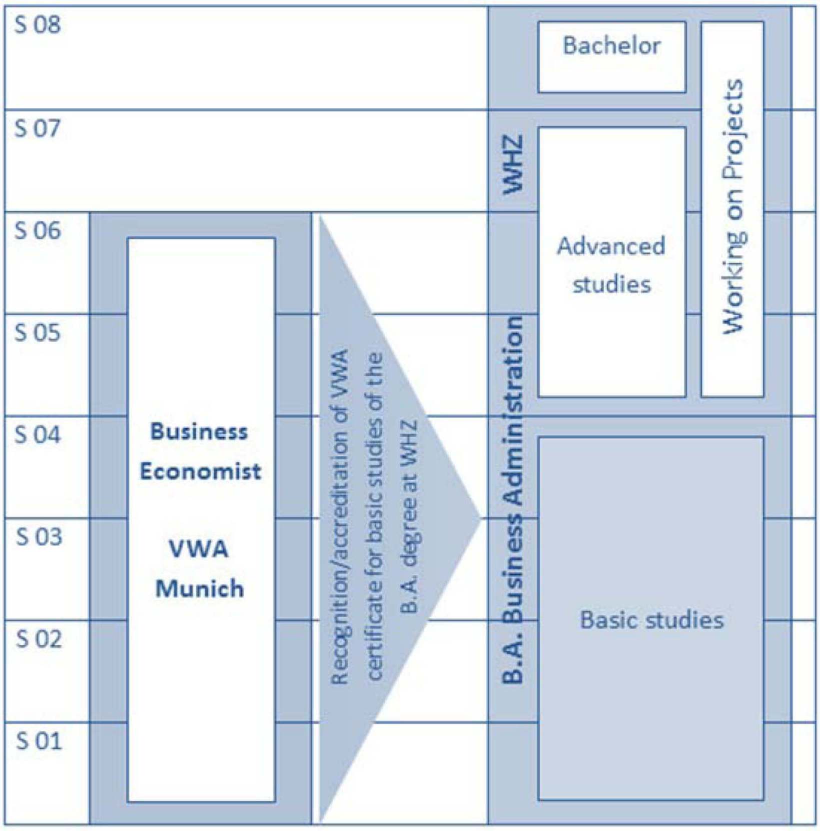

Figure 2. Full-integrated distance education program of a non-academic provider and a university

Now, the key question will be how interoperability can be used directly at the point of contact to the customer for open learning and training programs. The chance will be opened to intensify the cooperation with different educational providers by flexible interconnection of educational components using interoperable facilities. The results are the increase of the reusability, the improvement of the openness of the knowledge, the better independence from single providers, etc.

Interoperable platform development and application for learning and training

The development of interoperability was pushed by the experts for integration mainly from the software engineering dealing with application as well as information integration in a heterogeneous system environment. Instead of the integrated attempt to build a monolithic solution, the interoperability- based approach is focused on the exchange of meaningful, content-oriented data between autonomous systems. The view on the interfaces has to be changed because they have to support source and target systems by cross-system exchange in a smart way applying graph theory and ontology (Pollock, 2001). The main characteristic of interoperability is the ability of independency and heterogeneity of several systems for generating seamless cooperation, applicable interaction and efficient exchange of information (Schleipen, 2013). Levels of information systems interoperability were derived for a general view of enterprises. (Figure 3)

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Figure 3. Stage model for the development of interoperability in an application environment

The development of interoperability as philosophy, strategy, concept and model is going on for the different applications especially in business and industry (Kassel, Schumann, et al., 2009) as well as in further consequence in education and training with a focus on information systems as well as platform convergence (Paulsen, 2007) and a slightly tendency to content-driven services. The state of the art is that ICT based stakeholders for training and education, especially in the field of e- and m-learning, are able to provide the demanders with interoperable tools, platforms and concepts as well as the knowhow for the application of interoperable systems in training and teaching. Sometimes, the unsatisfying user-friendliness and practicability of the systems prove to be a hurdle for the further application.

But, the issues for developing interoperable applications for knowledge transfer as cognitive processes are the complexity and transdisciplinarity of the task, the dynamic development of the existing knowledge, the growing scarcity of qualified specialists and last but not least non-transparency of operational effects with perhaps skyrocketing costs. One of the latest ICDE reports on quality models reflects the topic only in the content of media design (Ossiannilsson, Williams, Camilleri, & Brown, 2015) because serious statements are so difficult by the current unavailability of enough information on the subject.

Evolution of open programs by using advanced knowledge

Interoperable systems are a prerequisite for interoperable applications. There are a lot of skills and experiences coming from the knowledge management or software engineering referring to the use of interoperability and already applied in the context of open and flexible learning. Especially, the increase of methodological knowledge was accelerated by re-design of monolithic contents into multivalent knowledge components which are cross-linked for special target groups of learners on demand. The learning objects are put into relations by semantic networks as a kind of knowledge representation (Figure 4) (Baier, 2008; Götze et al., 2013).

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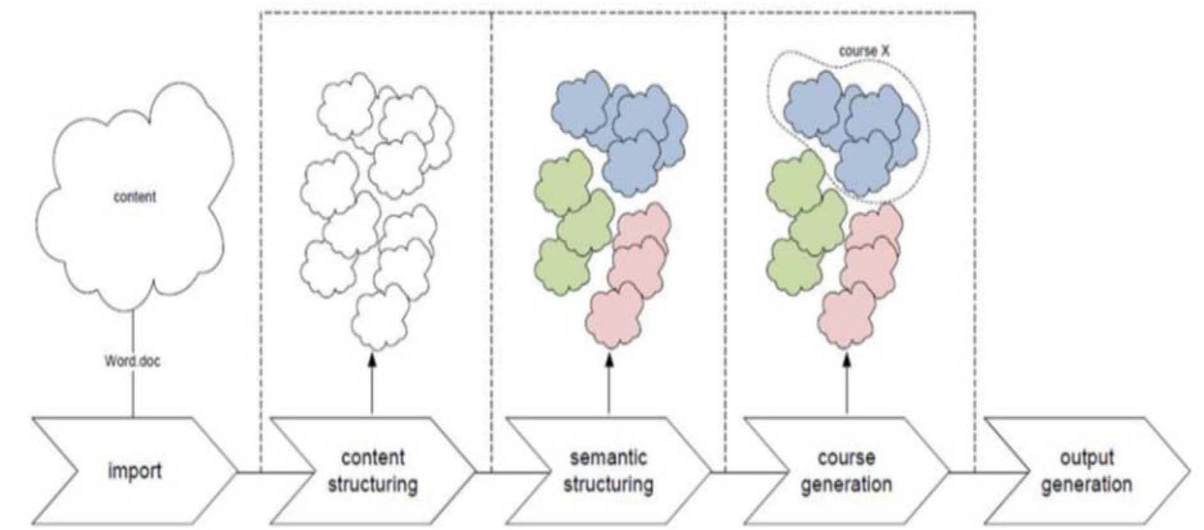

Figure 4. Interoperable re-engineering of holistic courses and contents by semantic technology (Presant, 2015)

The future applications of interoperability in open learning and training programs could be oriented towards the concept of open badges and portfolios (Presant, 2015). The principles should be similar. The participants are able to collect fixed and validated forms of recognition. The worldwide credit point system in higher education especially the unified European one will be used for adding completed learning and training activities rewarded and by credit points to a recognized body of individual knowledge (Buchem, 2015). The existing knowledge will be divided into knowledge units transferred by learning and training modules. The modules could be part of different programs fixing the general structure and content which is needed to come step by step to an academic degree. This method will guarantee consistency of the different educational programs and systems, the individualization of learning and knowledge transfer, the evaluation of the acquired knowledge as well as a reasonable combination of individual learning pathways with the requirements of useful degrees.

Recently, the first wave of applications is advancing including the use of system interoperability as well as semantic technology. The experiences by using autonomous and mobile logistic devices without central control based on interoperability and collective intelligence prove that simple rules for the interaction already lead to a first stage of functioning systems. The same results can be obtained for interoperable open education programs. (Figure 5)

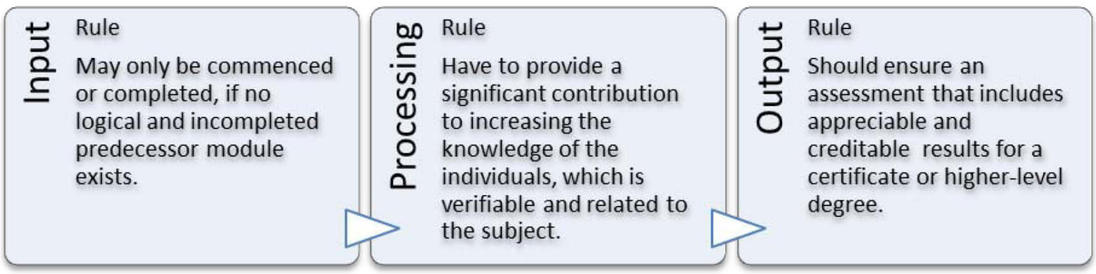

Figure 5. Input, processing and output rule for learning units of an interoperable educational program

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The approach can be matched with the principles of the more technology-enhanced learning based on Advanced Distributed Learning Initiative (ADL) including accessibility, adaptability, affordability, durability and interoperability (Vernadat, 2010) without central control system. The concepts was used for developing several study programs provided by an network of educational organizations in the national context and rolled out in different international programs supported by a global network of universities.

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OPEN EDUCATION AS DISRUPTION: LESSONS FOR OPEN AND DISTANCE LEARNING FROM OPEN EDUCATIONAL PRACTICE

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Introduction

This paper reflects on what Open and Distance Learning providers might learn from the Open Educational Resources/Practices (OER/OEP) and Massive Open Online Courses (MOOCs). It is based on experiences working on OER and OEP first at the OU in Scotland (OUiS) and more recently under the auspices of the Scottish Funding Council (SFC) funded Open Educational Practices Scotland (OEPS) programme hosted by OUiS. The paper by exploring the disruptive potential of MOOCs and OER within Higher Education. While it acknowledges lessons for HE it argues the focus on access and scale has obscured other lessons ODL might learn from opening up educational practices. Much of our work has centred on OEP and partnership with organisations outside the formal education sector. As such it has taken the possibilities offered by openness as an invitation to look at the relationship between the formal and the informal. The paper traces OEPS journey as it explores less apparent but no less important lessons around designing and creating open content through partnership in a way that is cost effective and context relevant.

MOOCs and Disruptive Innovation

In this first section we look at the rhetoric around MOOCs as a disruptive innovation, what we gain from the rhetoric and what may be obscured.

What is Disruptive Innovation?

There is a growing sense that OER and MOOCs are disrupting Higher Education, that they are a disruptive innovation that fundamentally change education paradigms (Barber et al, 2013). However, the case for them as a disruptive innovation is far from clear. A disruptive innovation is understood as a technological or process led innovation where the new entrant enters into the market by capturing a segment not well served by the incumbent. The incumbents have through time began to neglect their least demanding customers and allocating resource to satisfying high value highly demanding customers or particularly needy groups. A disruptive innovation recognises that for some customers the *extra* the incumbent offers is not required to satisfy particular customers, it disrupts from below (Christensen et al., 2015).

How do MOOCs disrupt ODL models? At the moment the *extra* provided by an ODL provider like the OU appears to be simply support and credit. Many of those using MOOCs and OER are people with credit and HE experience, self-regulated learners who can support themselves, so perhaps for them the *extra* offer is superfluous. Though as MOOC providers are finding out, with extra services it is hard to monetise the relations, and many are exploring credit and support. As some have wryly noted MOOCs are evolving towards ODL (Longstaff, 2014). However, the *extra* offered by ODL providers is more than support and credit. For example at OUiS it is based on a social mission, to promote social justice and reduce educational inequities. These values inform the value it creates for its learners. The *extra* relates to a focus on participation, not just access. Its more expensive model has a social purpose, and it is not clear whether openness and MOOC rhetoric is truly disruptive, or what is even disrupting.

Focussing on Disruption

If we look at the attention paid to OER and MOOCs it tends to focus scale, and how low transaction costs of online media widen access. However, as we have seen in the UK, widening access to Education (creating more places) does little to broaden the socio-economic base of those accessing those places (Dorling, 2011) and thus does little toward widening participation (Bathmaker et al, 2013). Those working in ODL understand access is very different from participation. The biggest disruption to ODL models might not be MOOCs, but state policies which have promoted access over participation, leaving a dwindling market for ODL and little support for organisations looking to create routes into learning for those distanced from education. The relationship between the MOOCs/OER promotion of access and the neoliberalisation of HE is far from clear (Macintyre, 2015a). In this sense ODL providers need take care what lessons they learn from OER and MOOCs, as the idea of disruptive innovation seems to break down when we consider products and process that relate to a values based mission and promote social justice and reduce inequalities.

This might seem a very partial and journalistic account of the MOOC phenomena, and clearly not all MOOCs are alike. However, MOOC/OER rhetoric is also partial, and ignores inconvenient aspects. Things that those in the Widening Participation and ODL communities are acutely aware. Consider digital participation and the tendency for the pedagogic models in open online courses to focus on competencies (like digital creation) that work on the Second Digital Divide suggests tend to privilege well educated people (Blank, 2013; Schradie, 2013). Consider also the direction of openness, MOOCs, and the OER movements have tended to focus on the releasing content created within HE, it often seems an attempt to reinforce the sense of the academy as the place where knowledge is created and through the clear focus on reputation enhancement an attempt to colonise public space. However, other models of openness are emerging, and it these approaches we explore in the remainder of this paper.

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Our Journey

In this section we tease out some lessons from our journey, we start by setting out the context, then highlight the emerging and contingent nature of our approach and providing examples of our shifting approach

First Steps in Partnership

Our work at OUiS is based on encouraging participation in education, and arose as a way to meet the needs of local partners. The OU UK has a centralised production model that creates high quality materials to be delivered at scale. While scale is important within ODL, the production model means smaller cohorts, or nation specific content are not economically viable. Our partners were concerned with *reach* rather than accredited formal learning, so we started to work with them to create free and open courses on the OU's open platform OpenLearnWorks. Through this we developed ways of working with partners and within (and sometimes around) the OU's production model. Our first efforts focussed on the production side, using approaches from User Experience and established patterns of learning design (Macintyre, 2013) to capture knowledge from partners, structuring it, and steering it through OU production.

Over time we realised partners were engaging with us and openness because they felt they had a need or want they could not meet. A deficit which they felt free and open online resources would fill, they were attracted by the rhetoric around MOOCs but uncertain about their place in the landscape. It was these uncertainties that led us to focus our work turned to the *fuzzy front end* of the learning design process. It was not that we became less concerned with aspects of production, rather we became more concerned with how we work in partnership, and what designing in partnership meant. In particular, our concern was to ensure the content created in and through partnership matched the context. That it drew on and out of the partners knowledge and expertise it met their needs.

These concerns arose from open educational practices. For example, in our original formulation we used ideas from "Design Thinking" (Brown & Martin, 2015) to start with what people need, and asked partners to map out their learners. However, we found the consensus we were able to build through collective visualisations of learners was based on individual assumptions or organisational myths about clients. With the content simply reproducing hidden assumptions about learners. This was based on our own unspoken assumption, organisations knew theirs learners. These assumptions formed from a model developed by OUiS where we had been working with organisations with the partners acting as a trusted source of support for marginalised groups, and OUiS gained trust by association (Cannell et al., 2015). While these were reasonable assumptions for our existing approach to outreach and ODL. Our partners were as uncertain in this landscape as we were.

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Emerging Patterns to Open up Educational Practices

We needed a different approach to understanding the learner within the design. Through work we conducted with end users as designers (Macintyre, 2014a, 2014b), based on ideas around participatory design and design thinking, we developed a series of exercises to tease this out (Macintyre, 2015b, 2015c). For example, based on "Rich Pictures" we would ask people to draw out their "ideal learner", we evoked the sense of the Platonic ideal form and asked participants to situate the learner in their context and define the learning needs and the transformation process, i.e. what they would become after the learning materials had met their need. We then asked them to conduct the same exercise for their actual learners. These different visions seemed to relate to the organisations understanding of learners, with the ideal form suggesting a great deal about the organisations resources and capabilities and ability to deliver certain kinds of learning, for those with a social mission it also teased out values and the value transformation. The actual learner opened up discussion about the organisations understanding of it learners, often these focussed on deficit, what the learners lacked, difficulties in dealing with particular groups of learners, but most often the lack of information people had about their learners. The ideal learner also links to the literature on reshaping WP identities into an ideal form (Byrom & Lightfoot, 2013), and thoughts of the working class autodidact (Rose, 2002). It led us into thinking about how we develop context relevant content, and drawing new voices into curriculum – a theme we return to in the discussion.

This is a basic principle in "Design Thinking", start with what people need (Brown & Martin, 2015), but we found our need was to get closer to the learners, to tease out tacit assumptions. While there is no formula, the sense of starting with who your learners are and what value(s) you want to create together we found a way to structure our approach. Based on work on designerly ways of knowing we started to talk about (Dorst & Cross, 2001; Dorst, 2011):

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WHO [are the learner] +HOW [are/is this transformation to be achieved] = WHAT
[value(s) and/or transformation]
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Having asked partners to think about learners needs, what they know about them, we then ask people to fill the gaps. We call this part WHO, and this links to WHAT, is the transformation, WHAT value(s) are created for the learner. While these are in preliminary state and many change over time, the next stage is about assessing whether the organisation can reasonably meet those needs – HOW. This is where we start to consider openness and online. HOW is part of the framing process within any design process (Dorst & Cross, 2001).Thinking about it as a frame allows us to explore our assumptions. For example, is HOW about creating an OER to support the transformation process. Just because openness is what we do, we ask people to reflect on the tacit assumptions that successful solutions always apply (Corbett, 2005; Holcomb et al, 2009). For us being clear about our tacit assumptions was about being open, about avoiding situations where, if a workshop participant suggest unease about OER and its role in HOW, they cast as being a barrier to openness. We have made those assumptions, and

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also observed people in partners who see openness as a solution suggest the reservations of their own staff are illegitimate – they are afraid of change.

This is why we opened up HOW, while participants had come to us because they felt OEP was HOW, we wanted to be open about the solutions, in particular thinking about the learner, the organisations resources and capabilities, its core competences, what it was good at (Grant, 2010). To think about the range of HOWs that existed within present practice and the strategic fit between OER/OEP and those existing practices. The workshops became more about the how openness fitted within the organisational strategy. These "bigger questions" often made participants feel a little uneasy, while we had positive feedback about them, about the space to open up those discussions, workshops of this type were followed by long pauses. Pauses that made us wonder about our approach. However, partners have come back, often after conducting internal reviews of outreach and engagement. Once an organisation feels that being open is part of its HOW, we then need to consider what being open enables for the organisation and its learners. We found that opening up HOW helped build trust within the partnership, and a clearer focus on how we might bring new kinds of content and approaches into the academy.

Discussion

OER and in particular MOOCs have through sheer numbers raised awareness of the possibilities around free and open. In particular amongst groups with a social mission, organisations with a remit for public good, who want to explore the possibilities of open and online to help them create social value as funding for these activities becomes constrained. Through our engagement with these organisations we have come to see another opportunity but a significant challenge for ODL providers, in particular the OU UK.

For an ODL provider like the OU scale and scope is a key part of the business model (Weinbren, 2015). The "Fordist" ethos of centralised high quality production developed when faith in the "White Heat of Technology" was high and communication technologies were expensive and centralised. Many of those assumptions have broken down and the OU has evolved and changed. However, content production is still centralised, it is based on a set of tacit assumptions which inform routines allowing it to manage quality in an efficient and effective manner (Grant, 2010).

However, as noted above while this approach promotes access, it does not always promote participation. Partnerships can provide the sorts of social and context specific support to promote participation that ODL can struggle to offer at scale. The opportunity is clear, organisations in this space with an interest in openness and a social mission are likely to be a good fit, with the sense of shared values helping to build trust. If these organisations are engaged in work with the very communities and individuals we want to target they are already a "trusted source" of support, ODL providers can reach into the places they would not otherwise be able to reach. Not just in relation to learners, but also in relation to curriculum as OEP offers the possibilities to bring new voices and new knowledge and skills into the

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academy. Here openness is less the established MOOC/OER broadcast monologue model of releasing content from within the academy, but about drawing new voices and approaches into the academy as part of a dialogue.

However, many of the assumptions and routines which have allowed it to shift into a dominant position in OER through mapping existing resources and capabilities from its formal offer across can make it unresponsive and inflexible. While we are not at the stage where its key strength has become a weakness (Miller, 1992), if the OU wants to realise the wider benefits of openness it does need to look carefully at the assumptions within its production model.

Conclusion

This paper suggests the focus on access within discourses on openness might be distracting us from less apparent but still important lessons we can learn from OEP. Opening up through partnership provides access to neglected learners, and ODL providers have employed this model to reach those distanced from education. However, it also offers the possibility (as yet generally unrealised) of developing new content and approaches. Curriculum which, rather than reshaping the learner to perform acceptable WP ("Working Class") identity explores how openness and partnership might develop context relevant curriculum. Opening up the academy to new voices and new approaches. However, this is likely to be a significant challenge for ODL providers. The tacit Fordist production routines potential to limit the ability to meet partners needs are only one aspect. As political support for participation wanes partnerships with organisations that share ODL's social values could allow organisations to create content that matches context in cost effective ways. However, care needs to be taken lest the temptation to further centralise control within ODL providers as a response to reduced financial and political support for organisational values of social justice at providers like the OU may leave these opportunities unrealised.

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DEAR EDUCATOR, HOW OPEN ARE YOU?

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Recognising teachers as change agents for openness in higher education

As a researcher working on open education, I often feel frustrated by the distance between the promises of openness in education, both in terms of increased equity and access and of improved efficiency of educational systems, and the actual impact of open approaches on out university systems. Surely, research shows that Open Educational Resources (OER), Open Educational Practices (OEP), Open Textbooks, Massive Open Online Courses (MOOCs) are increasingly being adopted by universities around the world (Grodecka & Śliwowski, 2014; Esposito, 2013; European Commission, 2013); but at the same time many observers agree that the outreach of the openness in education is still limited (Rohs & Ganz, 2015; Kortemeyer, 2013; Hollands & Tirthali, 2014; Glennie et al., 2012; Okada et al., 2012). The situation is certainly evolving and openness is increasingly being accepted in higher education policy and practices; nevertheless we need to accept that the consideration made by Conole in 2008 is still valid today: "Arguably then there has never been a better alignment of current thinking in terms of good pedagogy – i.e. emphasising the social and situated nature of learning, rather than a focus on knowledge recall with current practices in the use of technologies – i.e. user-generated content, user-added value and aggregated network effects. Despite this, the impact of Web 2.0 on education has been less dramatic than its impact on other spheres of society – use for social purposes, supporting niche communities, collective political action, amateur journalism and social commentary" (Conole, 2008, quoted in Weller, 2012; p.89).

In recent years, I have had the chance to talk about openness with a number of university professors and lecturers, discussing the benefits and the problems connected to the adoption of open approaches such as OER, and I have grown the conviction that educators are the cornerstone that we need to focus on if we want to shorten the distance between the potential and the actual implementation of openness in higher education. Educators represent in fact both the highest resistance and the potential best promoters for any innovation in education, and if they would fully engage with the open education movement the whole process would be more inclusive, creative and rooted to the real needs of learners. A number of observers agree with this priority, recognising the importance of the involvement of faculty members in open education initiatives (Albright, 2005; Pearce et al., 2010) and considering that teachers are actually the final decision makers for the adoption of open approaches (Allen & Seaman, 2014; Price, 2015).

The transition of teachers towards openness must be understood as a part of a broader change process, connected both with the crisis of university systems (Sledge & Dovey Fishman, 2014; High Level Group on the modernisation of Higher Education, 2013) and with the possibilities offered by ICT. University teachers are traditionally considered as the ones who *own* the body of knowledge that needs to be communicates to students for them to get *educated*. This role is being increasingly questioned by educational researchers, who claim the thanks to the spread of ICT and to the open and networked approached that they have made possible, new forms of social learning are emerging that challenge traditional roles within education systems, and in particular the idea that teachers are the only ones entitled to produce and transmit knowledge (Schmidt et al., 2009). In other words, researchers seem to agree that teachers should change the way they work and become critical friends, co-travellers, mediators, facilitators (Dron & Anderson, 2011; Downes, 2012; Rivoltella & Rossi, 2012; Goodyear et al., 2001; McLoughling & Lee, 2008). "Since the distributed and networked structure of knowledge in the digital age challenges the traditional view of education delivered within the borders of school, strict time periods, and content, the role of the teacher has been redefined in the context of the connectivist paradigm to include networked learning environments" (Ozturk, 2015; p.6).

To facilitate this change process, the Open Educators Factory project, funded by the Universidad Internacional de La Rioja (UNIR), is exploring how to transform university teachers from *agents of resistance* into *agents of change* for openness in education. During its first year of work, the project has been reflecting on the change process that is needed to empower teachers to become agents of change towards the adoption of open practices in higher education, producing a definition of *Open Educator* as well as a multidimensional teachers development framework able to guide educators in embracing openness in their daily practice.

What is an Open Educator?

If we want teachers not only to accompany but rather to drive the change towards openness in education, in a moment where this would be possible thanks to the increasing adoption of technology coupled with developments such as Open Educational Resources, Open Licensing, Open Publishing, Open Design, we need to have a clear and possibly shared understanding of what we mean by an Open Educator. This would help decision makers at different institutional and policy levels as well as the teacher population itself to have a clear development target towards which to work. Interestingly, while definitions of OER and Open Education are abundant in policy as well as in scientific literature – even if some degree of disagreement on what openness means in a number of contexts still exists (Bates, 2011; Deyman & Farrow, 2013), a definition that encompasses openness within all dimensions of teachers' activities does not seem to exist. Existing literature seems to be focusing mostly on the "objects" of Open Education, namely Open Educational Resources and more recently MOOCs (Allen & Seaman, 2014; Cormier, 2009; De los Arcos et al., 2014; Kortemeyer, 2013; Rolfe, 2012; Wild, 2012 among others), and on its "processes", namely Open Educational Practices (Andrade et al., 2011; Esposito, 2013; Murphy, 2013; Okada et al., 2012 among

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others), Open Learning Design (Conole, 2013; Laurillard, 2012; Cochrane & Antonczak, 2015 among others) and Open Scholarship (Pearce et al., 2010; Weller, 2012 among others).

To fill the gap given by the absence of a shared definition that can represent a clear target for the *transformation of teachers into open educators*, the Open Educators Factory project has worked out a definition which takes into account both the *objects* (teaching content and tools) and the *processes* (learning design, pedagogical and assessment approaches) of teachers' activities. This definition results from an extensive literature review and has been fine-tuned and validated trough discussions with experts in the field of open education. The definition has been discussed and validated with Martin Weller from the Open University in the UK, Wayne Mackintosh from the OER Foundation in New Zealand, Rory Mc Greal from Athabasca University in Canada, Chrissi Nerantzi from the Manchester Metropolitan University in the UK, Antonio Texeira from the Universidade Aberta de Portugal and Daniel Burgos from the Universidad Internacional de la Rioja in Spain.

Our definition of the Open Educator is the following:

An Open Educator chooses to use open approaches, when possible and appropriate, with the aim to remove all unnecessary barriers to learning. She works through an open online identity and relies on online social networking to enrich and implement her work, understanding that collaboration bears a responsibility towards the work of others.

An Open Educator implements openness along four main activities. She:

1. Implements Open Learning Design, by openly sharing ideas and plans about her teaching activities with experts and with past and potential students, incorporating inputs and transparently leaving a trace of the development process.
2. Uses open educational content, by releasing her teaching resources through open licenses, by facilitating sharing of her resources through OER repositories and other means, and by adapting, assembling and using OERs produced by others in her teaching.
3. Adopts Open Pedagogies, fostering co-creation of knowledge by students through online and offline collaboration, allowing learners to contribute to public knowledge resources such as Wikipedia.
4. Implements open assessment practices such as peer and collaborative evaluation, open badges and e-portfolios, engaging students as well as external stakeholders in learning assessment.

The definition starts with a general paragraph that contextualises the expected transformation of teachers with the existing higher education context, by stating that an Open Educator chooses to use open approaches *when possible and appropriate*, meaning that openness should always be adopted if and when it can improve the teaching process and the learners

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accessibility and performance. The paragraph then provides a clear reason for educators to opt for open approaches, that is *to remove all unnecessary barriers to learning*: here we mean both access-related barriers, connected for example with the socioeconomic status of students or with students' disabilities, but also the more subtle barriers connected to learning personalisation and learning styles and preferences. Then, it is specified that an Open Educator should work through an open online identity and rely on online social networking to enrich and implement her teaching, making clear the connection between being open and being networked. Finally, we mention the importance of understanding the responsibility towards the work of others that comes with the adoption of open approaches, meaning that an open educator should be cautious about copyright, privacy, and ethical issues connected with openness.

In its second part, the definition suggests that openness should pervade all the components of teachers' work: the way a teacher designs her courses, the way she licenses, creates and shares learning content, the pedagogical practices and the assessment approaches implemented. The definition is based on the assumption that a correct process of *opening up education*, to use the wording of a recent initiative by the European Commission (European Commission, 2013), should be based on opening up all these four components (design, content, teaching, assessment) that ideally shall coexist and complement each other within a generalised open culture. First, opening up learning design, by co-designing curriculum and courses with peers and students and allowing the courses to evolve and improve year after year, as "a creative way to breath new life and fresh ideas into course design" (Cochrane & Antonczak, 2015; p.3). Second, opening up the teaching content, typically by releasing material as Open Educational Resources by and making it findable and usable by others. Third, adopting open pedagogical approaches, intended as a mix of strategies and tools that can make the learning process more transparent, partecipative, understandable, and available to all involved actors (Grush, 2014). Fourth, implementing open assessment practices such as peer evaluation or e-portfolios. Transversally to these four elements, an open educator works to open up the organisational and learning boundaries of her teaching activities, for example allowing students to follow courses in an open MOOC style also if they are not enrolled in the university (Dalsgaard & Thestrup, 2015), or working towards the provision solutions towards accreditation of the knowledge acquired (Peterson, 2014).

Time to go beyond OER and OEP

Embracing openness is a process that has to do with a major mind shift and that affects all areas of a teacher's work. To understand how deep this change is, it is worth considering the keywords that, according to Siemens (2010), should guide teachers in a connectivist world: amplifying, curating, sense-making, aggregating, filtering, and modelling: most of these concepts would simply not be immediately understood by a traditional teacher. The introduction of open and networked practices brings a number of tensions which have to do with the educators' attitudes and self-perception, related to the need of rethinking ad reshaping the roles played by teachers and students within the learning process and the underpinning knowledge production process, working in an open and transparent

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environment where all traditional implications of learning design, delivery and assessment are questioned (Crook & Harrison, 2008; Rivoltella & Rossi, 2014; Orr et al., 2015). These tensions are further exacerbated by the generalised low level of adoption of social media in teaching settings (see for example Jaschik & Lederman, 2013). To give an example, a recent survey targeting the whole HE teaching population in Italy reports that the great majority of respondents never use Twitter (94.5%), Slideshare (84.5%), or Researchgate/Academia.edu (74.4%) for teaching purposes and that "Social Media tools are mainly perceived as a waste of time, as a great concern about privacy and as a risk to weaken the traditional roles of teacher and student" (Manca & Ranieri, 2015; p.110).

In 2009, Wiley and Hilton defined open educators as the ones who "publish their course materials online under an open license before the beginning of the course and invite students from outside their university to participate in the course together with the official students of the course" (Wiley & Hilton, 2009; p.11). Even if this definition contains important elements of openness such as the encouragement of the participation of non-traditional students, we believe that adopting OER is just the first necessary step for educators to get open, and that, in order for openness to deploy its full potential for change within higher education, other elements should be present in our understanding of Open Educator.

Similarly, an Open Educator should not be defined merely as a teacher who adopts Open Educational Practices (OEP), since in our understanding open teaching can take place even without the use of OER, while typically OEP are defined as a further step of the *openness journey* that follows and enriches the use of OER. OEP are typically defined as the use of OER in the frame of open learning architectures (Camilleri & Ehlers, 2011) or as "practices which support the creation, use and management of OERs through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path" (Andrade et al., 2011; p.12). The OPAL consortium (2011) appropriately states that OEP foster the incorporation of social learning in the learning environment, but then again connects the use of open methods to OER: "The social learning element is coming in because learners can use educational resources, modify them and present them to other learners (modification of OER or User generated Content), knowledge environments on the basis of OER can be created by learners and shared with other learners or teachers (e.g. social bookmarking, Wikis, collection of resources)" (OPAL Consortium, 2011; p.3).

We believe it is important to *disconnect* the concept of open teaching from the use of OER since many teachers are indeed using open methodologies in their classroom activities, for example by fostering co-creation of knowledge from students allowing them to enrich the course content with any complementary information they deem important. In our view, these teachers can be indeed considered Open Educators even if they do not explicitly use – and maybe do not even know the existence of – OER. Differently from a *developmental* understanding of openness in education that defines steps of adoption (first OER, then OEP, etc.), our definition pushes the idea that a number of *entry points* into openness (learning design, content, methods and research) should be recognised, since this would motivate a

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teacher who is already used to *think openly* in one of these domains to explore and adopt open approaches in the other domains.

Next steps: putting the definition in practice

To help the development of teachers' *openness capacity*, we propose an original self-assessment and development framework for teachers, which takes into account all the dimensions of openness included in the above definition, making clear the different typologies of educators with respect to openness in a comprehensive picture that includes all areas of activity of an educator.

	A. Design	B. Content	C. Teaching	C. Assessment
Layer three: Open collaboration	Open designer	OER expert	Open teacher	Open evaluator
	Transition phase: Transformation into Open Educator			
Layer two Bilateral collaboration/ Small groups	Collaborative designer	OER novice	Engaging teacher	Innovative evaluator
	Transition phase: Awareness			
Layer one: Individual work	Individual designer	OER-null	Traditional teacher	Lone evaluator

Figure 1. Self-development framework for Open Educators

In the columns we represent the four areas of activity of our open educator definition (design, content, teaching and assessment), while in the rows we categorise – with a necessary degree of generalisation – the different typologies of educators with respect to openness for each area of activity. Starting from the bottom, for each column we have defined three levels of openness that an educator reaches once she goes through some necessary transition phases, which are transversal to all four components. The first transition phase has to do with being aware of open approaches, and represents still today the main obstacle for the teaching populations to opt for openness (Browne et al., 2010). The second transition phase deals with becoming *fluent* with openness: once gone through this transition, an educator is expected to adopt open approaches as default in the way she designs her courses, she develops and shares content, she interacts with students, and she carries on learning assessment.

This framework would be useful at two different levels. First, an individual educator can self-assess her level of openness in each area of activity (the columns) and be exposed to other possible developments in areas of openness that she has not yet explored. Second, a university department leader, provided that all educators in her department have positioned themselves in the framework, can appreciate the level of openness capacity of her staff, understanding who are the leading faculty in terms for open approaches. In the next phase of the OEF research project, the framework will be tested with a number of university educators, in order to both validate the approach we have taken in the project and to actually analyse the development of a sample of university with respect to open approaches.

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RESEARCHING LAUREATE'S EUROPEAN HYBRIDITY INITIATIVE

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Introduction

Hybrid or Blended Teaching and Learning is the combination of learning and instruction originating in two separate models of teaching and learning: traditional F2F learning approaches and distributed learning approaches. Hybrid and Blended also assigns a central role to computer-based technologies (Graham, 2006). Finally, Hybrid teaching and learning relates to the way whole programs are taught.

Drawing on these distinctions, this preliminary paper looks into the launch of an innovative project in higher education which involves the utilization of new forms of education in a number of tertiary institutions belonging to the Laureate International Universities Network in Europe. The focus is on the challenges of launching such an innovation in social settings which are characterized by distinctive educational features and profiles.

For this purpose, Laureate has defined its own taxonomy to identify what face to face, blended, hybrid and online teaching means at program and at the course level at involved institutions which are asked to comply with the same prescribed set of principles and policies in transforming their conventional programs to achieve a delivery of 25% of instructional hours in an online modality. The rationale for introducing this innovation is discussed by looking into the comparative advantages that are expected to accrue for the participating institutions but more importantly for the students who will be exposed to these new forms of learning.

Background

Laureate is the world's leading for-profit education provider with a network of close to 90 institutions around the globe, representing over 1,000,000 students. Laureate runs Walden, its flagship fully online university with over 50,000 students and partners with several renowned educational institutions (e.g. University of Miami, University of Liverpool and University of Roehampton, London) in the provision of their online programs.

In 2015, Laureate embarked on a network wide initiative to achieve 25% hybridity across its network by 2019. This goal entails the delivery of 25% of total teaching hours in an online format at each institution. The goal, which represents a significant transformative mandate for all Laureate institutions, originates in the broader recognition that education is rapidly changing, driven by new learner requirements and the evolution of learning technologies which are entering the classroom. Importantly, these trends imply the need for a significant rethinking of classroom pedagogy.

In Europe the majority of Laureate's 24 institutions exemplify a traditional teaching and learning profile. Hence the organization's hybridity goal represents a major transformational challenge. At the same time from a research perspective, Laureate's hybridity goals represents a unique opportunity to study the methods, impact, challenges and successes of online teaching and learning as these evolve across autonomous institutions, joined by a broader organizational imperative.

The educational advantages of this innovation

About a decade ago using the means of educational technology available at the time there was recognition of the positive effects of Blended education in Medical Education (Bernardoa, et al 2004). Today the staggering breakthroughs in ICTs and other educational means available to offer on-line and distance education programs, these advantages are even more evident. Previous experiences across Laureate have proven that, while the learning results through online instruction might in some cases be better than campus based ones, the introduction of contact between students and professors further improves participation and engagement (Redondo & Benito, 2012). There are of course other important educational advantages when turning traditional instructional methods into blended, taking advantage of the realities of the 21st century. Most importantly, learning in this new form becomes more active and dynamic. This is achieved because:

- blended learning activities promote increased engagement with course material,
- blended learning promotes continuous interaction with peers and faculty, and contextualized discussion based on learning activities,
- online interactive learning activities allow students greater flexibility to organize their weekly schedules (Lotrecchiano et al., 2013)

In sum, a blended learning strategy places the student at the centre of the pedagogy and stimulates the combination of different pedagogical elements to deliver this experience in the best possible manner.

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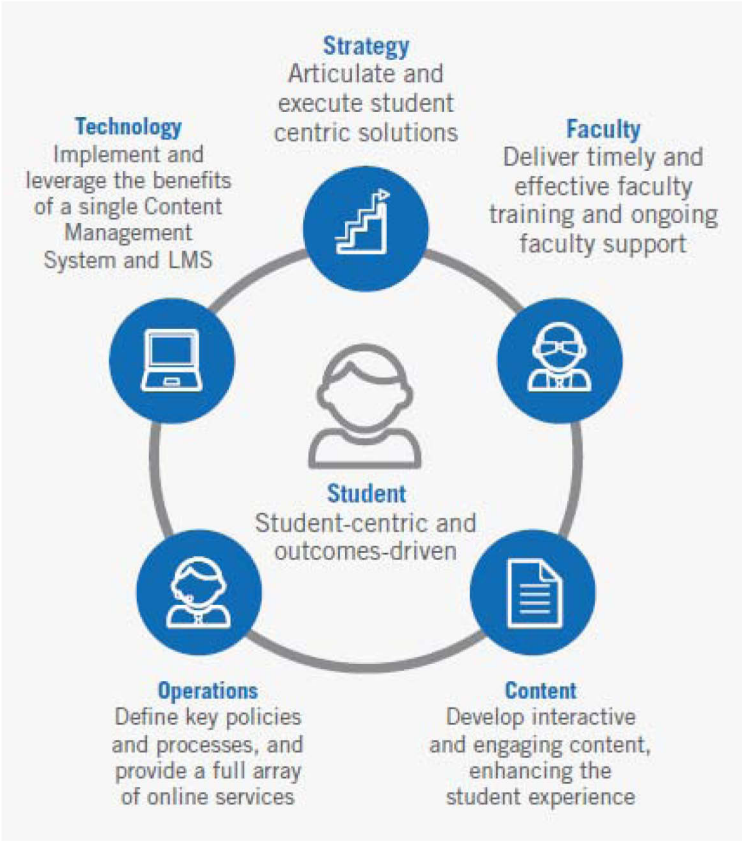

Figure 1. Source: Laureate Network Office, Achieving Laureate Hybridity Goal, www@lno.laureate.net

Research setup

In order to achieve the 25% hybridity mandate Laureate has created the Laureate Network Office, which is tasked with helping its institutions achieve their 25% by transferring knowledge, skills, best practices etc. between Laureate and its institutions. Each institution moreover has organized resources internally to help advance their own hybridity goal. Individuals associated with this initiative are collectively responsible to help their organizations transform and perform.

Transforming and performing entails an education, implementation and assessment track which will run between 2016 and 2019 during which each institution is expected to:

- Re-assess their pedagogy in light of the demands and rational of online and blended teaching and learning.
- Redesign 25% of their courses to be delivered online or in a blended format.
- Train their faculty to be have the needed skills for online and blended delivery formats.
- Adopt and train the necessary staff in the use of a common LMS (Blackboard).
- Create and administer online and blended learning quality assessment procedures and metrics.

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- Track faculty and student performance and satisfaction with online and blended formats.

The coordinated nature of this endeavour (across geographies and within a specific timeframe) is unique and lends itself to a series of comparative longevity studies.

Initial research topics and questions identified include:

- A comparative study (qualitative) of how key European Laureate institutions reframed their organizations toward hybridity; a comparative study analyzing the process and learnings.
- A comparative study (quantitative) of faculty and / or student perceptions, responses to and satisfaction with hybridity.
- A comparative study (qualitative) of regulatory frameworks supporting and / or inhibiting hybridity across the European continent.
- A comparative study (qualitative) of the type of blended learning models to emerge at different institutions and their effectiveness.
- A comparative study of student learning outcomes (quantitative) via hybridity vs. traditional learning modalities.
- A comparative study (quantitative) of hybridity adoption rates across participating institutions.
- A comparative study (qualitative) of the effectiveness and / or success in scaling hybridity up to 25% at each institution.
- Conclusions around (quantitative) operational and business assumptions (cost saving proposition through space saving) tested against actual expenses based on hybridity implementation.

The contemplated research topics cut across a spectrum of EDEN-identified themes and key words. Broadly addressing the transition from one learning environment to another (from F2F to online and blended), the data gathered will inform more specifically questions around the generic effectiveness (pedagogically) of the digital environment and how such effectiveness might vary across social and cultural boundaries (i.e. different Laureate institutions across the European continent) and be impacted by different pedagogical approaches (i.e. pedagogical *brands* of participating institutions). Finally, institutional success in achieving hybridity at scale will be an important research interest.

Research output

Selected studies will be grounded in systematic data gathering and analysis between 2016 – 2019. Yearly interim progress publications (internal and external) and a final publication (2019) are intended. Final determination of research scope depends on the resources (financial and human) the research team is able to secure by end of Q1 2016.

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While the group of researchers involved in this project will be kept small for effective collaboration purposes, in order to broaden the scope of research, additional Laureate institutions will be invited to contribute research data toward predetermined research questions. The invited institutions are the following:

- Istanbul Bilgi University, Istanbul, Turkey – http://www.laureate.net/OurNetwork/Europe/Turkey/IstanbulBilgiUniversity;
- École Centrale d'Electronique, Paris, France – http://www.laureate.net/OurNetwork/Europe/France/EcoleCentraledElectroniqueECE;
- École Supérieure du Commerce Extérieur, Paris, France – http://www.laureate.net/OurNetwork/Europe/France/EcoleSuperieureduCommerceExterieurESCE;
- European Business School Paris, Paris, France – http://www.laureate.net/OurNetwork/Europe/France/EuropeanBusinessSchoolParisEBS;
- Les Roches Marbella, Marbella, Spain – http://www.laureate.net/OurNetwork/Europe/Spain/LesRochesMarbella;
- Real Madrid Graduate School, Madrid, Spain – http://www.laureate.net/OurNetwork/Europe/Spain/Real-Madrid-Graduate-School;
- Universidad Europea de Canarias, Canary Islands, Spain – http://www.laureate.net/OurNetwork/Europe/Spain/UniversidadEuropeadeCanariasUEC;
- Universidad Europea de Valencia, Valencia, Spain – http://www.laureate.net/OurNetwork/Europe/Spain/UniversidadEuropeadeValenciaUEV;
- IEDE Business School, Madrid, Spain – http://www.laureate.net/OurNetwork/Europe/Spain/InstituteforExecutiveDevelopmentIEDE;
- IADE – Creative University, Porto, Portugal – http://www.laureate.net/OurNetwork/Europe/Portugal/Instituto-de-Arte-Design-e-Empresa-IADE;
- Instituto Português de Admistração de Marketing, Lisbon, Portugal – http://www.laureate.net/OurNetwork/Europe/Portugal/Instituto-Portugus-de-Admistrao-de-Marketing-IPAM;
- Universidade Europeia, Lisbon, Portugal – http://www.laureate.net/OurNetwork/Europe/Portugal/UniversidadeEuropeia.

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Challenges ahead

As suggested, teaching online requires more than the development of technical skills; it requires new pedagogical approaches, new working partnerships, new methods of instructor and student motivation, new staffing roles and structures and new models of student support (Phelps et al, 2000).

This implies that the teaching and learning innovation contemplated across the Laureate network signifies primarily a cultural change for those institutions which have established traditional practices in the delivery of University Education. There are a number of challenges of performing such a cultural shift. These mostly relate to addressing possible resistance within institutions and externally, found for example in conservative accreditation institutions and student mentalities whose expectations are firmly rooted in what is familiar and known. Other challenges relate to:

- uniformity in setting up the LMS;
- predictability when it comes to format of courses;
- retaining student's engagement and motivation;
- enhancing Student performance;
- retaining Faculty satisfaction;
- QA review procedures.

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Re-Imaging Learning Environments
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THE ECO PROJECT FOR E-TEACHING: SOCIAL MOOCS AT THE CROSSROADS OF ACTORS' COGNITIVE LOGICS AND STRATEGIES

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This communication examines personal and collective e-learning strategies and emergent uses and practices, based on the implementation of the European project ECO, for the e-training of teachers via MOOCs. ECO is financed within the framework of the program *Competitiveness and innovation Framework Programme* (CIP), Theme 2: *digital satisfied, open dated and creativity*. The main corpus consists of questionnaires, interviews, conversation threads in the forums and the social networks as well as exchanges between members of the teaching staffs of the experimental sMOOC *Step by Step*. The analysis focuses on several intercultural actors' logics: it connects universities, private and public schools, communication and information systems, all with different cultural origins (seven European countries). The project is itself an *open* co-creation that brings together several professional cultures (teachers, engineers, computer scientists, community managers, …). It also builds on a number of cognitive elements that buttress interaculturality and intercreativity and point to some important lessons for the management of interculturality and intercreativity in Europe and beyond.

This innovative framework leads to emergent practices in the training of teachers (the public targeted by the project). It affects in particular their learning style because it brings together the integration of the cognitive strategies of the teachers/trainers, and the collaborative practices between peers. The techno-pedagogical framework relies on participatory MOOCs (or sMOOCs) supported by a socio-constructivist and connectivist theory of learning. Specific to ECO, it allows the teachers / trainers to benefit from an intercultural learning situation, propitious to new cognitive logics; it enhances new strategies that place them in a position of producers and administrators of their resources.

ECO is based on the hypothesis that, in sMOOCs, interculturality meets intercreativity. Being creative in partnership with people outside one's culture, one's area of expertise and one's comfort zone builds community and understanding across cultures. It may also bring transformative changes when several cultures interact with each other. Interculturality is precisely defined by the process of exchanges between cultures in contact (Devereux, 1972; King, 1997; Demorgon, 1996; Ladmiral & Lipiansky, 1991). This contact implies a construction of culture as several layers of interactions that peel off like an onion: the national layer (e.g. language, politics), the institutional layer (e.g. school systems, teaching styles, educational designs) and finally the professional layer (e.g. engineers, managers, designers, teacher/users) (Demorgon, 1999; Demorgon et al., 2003).

Interculturality implies both a dialogue where exchanges are identity-driven and a dialogue where exchanges are idea-driven, which may cloud or clarify the interactions. A double movement is created between "eagerness to understand" (vouloir comprendre) and "eagernes to be understood" (vouloirêtre compris) (de Vallescar, 2001; p.404). This double movement enables a horizontal dialogue between participants that calls on cognitive strategies for empathy, for tolerance, for reciprocal learning across cultures. It offers equal opportunities for learning between people who don't actually know each other.

In this intercultural context, cognition, defined as the mental processes that facilitate information processing and rely on attention, attribution and group dynamics, contributes to social learning (Frau-Meigs, 2011). This social cognition deals with the management of emotions, of experiences and knowledge to solve problems and to shape decisions, attitudes and values under the observation of others. Cognitive processes intertwine reason and emotion, and are related to empathy, which allows all actors to understand each others' feelings, to revise their values and their acquired knowledge and routines so as to justify their choices on the basis of cultural and professional constructs (Damasio, 1994; Decety & Ickes, 2009; LeDoux, 1996; Livet, 2002).

According to Donald Merlin (2001), cultures engineer *cognitive networks* that ensure the transmission of values, attitudes and institutions. He emphasizes cooperation as a means of showing that human wellbeing relies heavily on interactions with others. In the case of sMOOCs, mediated by ICT-driven media, the pedagogical design fosters the construction of communities of practice that interact with each other and build their knowledge through collaboration and interactions (Siemens, 2005; Osuna et al., 2016). This lead to the original idea of creating a reflexive sMOOC, the sMOOC *Step by Step*, in order to have an observable intercultural and intercreative situation that can be used as a template for other sMOOCs.

The sMOOC Step by Step: designing interculturality in teacher training

The design of the *sMOOC Step by Step* tests the process of interculturality in relation to intercreativity: it brings together six national cultures, ten hubs that represent local institutions and three major professional cultures (manager, user, computer engineer). These professionals have several profiles, including teachers, pedagogical engineers, facilitators, learners and community managers. Additionally, several disciplines come into play, such as management, education, communication and computer engineering.

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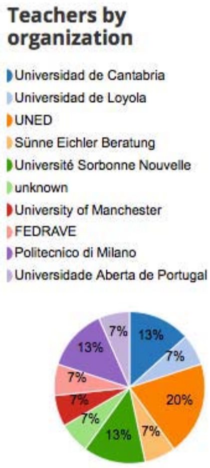

Figure 1. Teacher by organizations.
Nb: "unknown" category refers to outsiders of the project (volunteers, experts, partners)

This amount of interaction fosters a climate of intense exchanges that feed interculturality. Besides, the participants share a repertoire of online e-strategies such as gamification, content aggregation, sampling, multimedia creation and diffusion (text-image-sound), sharing of resources, networking, transmedia navigation and communication and peer-to-peer coordination (Jenkins, 2009; Frau-Meigs, 2011). This repertoire of e-strategies fosters collaboration, mutual attention and helps decision-making across cultures.

The overall design was devised by a single team representing all ten of the ECO hubs. The French and Spanish coordinators supervised the entire process and ensured continuity and collaboration. Each of the seven sessions in the sMOOC was created by two hubs working closely together and mixing languages and cultures: German/Spanish, French/Spanish, Italian/French, Portuguese/Spanish, French/Portuguese, English/French and English/Spanish. Since English was the lingua franca across hubs and teams, the English partner was entrusted with the task of supervising the quality of the English used in the sessions. Each country then translated from the English into its own language (See Table 1).

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Table 1: Intercultural teams: Hubs by sessions by tasks

	Institution / Session	UniCAN	UoMan	SE	Fedrave	Sorbonne	Loyola	UNED	UAB	POLIMI
Supervision	All									
Global pedagogical design	All									
Pedagogical design / session	1									
	2									
	3									
	4									
	5									
	6									
	7									
English quality control	All									
Translation and facilitation in each language	English									
	Spanish									
	French									
	German									
	Portuguese									
	Italian									

NB: the grey zones are zones of interaction between national teams

Interculturality was further facilitated by the openness of the resources and tools shared via Creative Commons. The teacher/trainers could thus upgrade their collaboration and increase their communities of practice. The use of the *Agile method* of management also improved interculturality during the three iterations of the project. The agile method is socio-cognitive by nature as it enhances problem-solving through experience, collaboration and with self-organizing, cross-functional teams. In ECO, the teams are not only cross-functional but also cross-cultural, so as to promote adaptive planning, rapid responses and context-based development (Beck et al., 2001).

Cognitive strategies in participatory sMOOCs

The results of the sMOOC Step by Step show some cognitive elements at play. The cognitive dimension implies distributed competences that are both individual and collective. It appears that the more intercultural people are, the more likely they are to solve problems unexpectedly and to support decision-making. Also the more diverse a community, the more likely it will be to generate original ideas and to modify traditional hierarchical structures and relations to information and knowledge. Besides, some kind of "policing" happens in intercultural situation that transforms stereotypes and generates positive behaviours as people learn about each other's cultures and clarify their positions, eager as they are to understand and be understood.

Among the major cognitive elements at play, the main ones are: attention (focus), empathy, tolerance of error and of ambiguity, and decentring. They are particularly important to intercultural cognitive agile management.

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Interventional and accidental focus: monitoring the entire environment and being ready to interact

Through the cognitive processes of attention and attribution, the online space of the sMOOC moved towards a transcultural laboratory experience with attention turned into intense "focus" activity. This activity was both conscious and interventional focus (the action of others impacts decisions by participants back in their own language), and accidental or serendipitous focus (the actions of others in previous and parallel MOOCs have an impact on the repertoire of actions and resources of *Step by Step*).

This dual focus exemplified the fact that cooperation and collaboration are not interchangeable terms, as suggested by Cerisier (1991). Cooperation works as a collective organisation where tasks are fragmented and distributed either horizontally among all actors or according to each person's competences. Collaboration on the other hand, relates to a working situation where the task and the goal are common, all the actors working in coordination. Bartel and Saavedra confirm that collaboration is indeed focused on a common goal and they add that this collective intelligence is enabled by digital tools and affordances. They also point to the importance of the diversity of participants as "source de performance et créatrice de valeur" (Bartel & Saavedra, 2000).

This conceptual distinction rests on the nature of the operations and the distribution of the tasks. According to this distinction, a working collective relies partly on a logic of cooperation and partly on a logic of collaboration. In the experience of the Step by Step, co-construction can use different combinations of collaboration and cooperation, either from the beginning, or through diverse iterations that provide perspectives on the reactions to the new resources and contributions.

Both types of focus came with a certain amount of risk because they required a high level of management to mitigate the lack of understanding between professional cultures in particular (criteria of evaluation, cognitive scaffolding, weighting of the grades, quizzes, …). The proximity of some notions also led to confusions (units/modules, levels/paths, tasks /activities, rules/instructions). Diverse forms of cultural management due to national cultures created unease until the problems were identified and clarified. The solution consisted in creating regular weekly meetings after the first iteration. The persons in charge of certain tasks attributed more time to tutoring and moderating sessions.

Some countries are less propitious to a culture of participation and tend to be weary of the intervention focus. Some teams tended to wait for instructions and for requests regarding resources and regarding documents, whereas others took initiatives without waiting to be asked. Intervention elicited a certain amount of fear of judgment by others and the fear of making mistakes, in spite of the declared philosophy of experimentation by trial and error and the Agile method. Besides the process was somewhat asymmetrical, due to the heavy presence of partners from Spain, who had a de facto numerical advantage

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This asymmetry was counterbalanced by alliances across the teams and by efforts of greater communication between all teams. For instance, instructions were given on how to use communication spaces (groups, forums, micro-blogging, social networks…). At first each team was left to organize itself at will; but then the teams all started focusing on each other; and finally, due to serendipitous focus, they built "standard" instructions, on the basis of a French good practice, which led to a much improved management of all the spaces for exchange. (See below the French good practice and its adaptation in Italian.)

La session 3 est elle aussi ouverte, nous vous invitons à la découvrir et vous enverrons très vite un message récapitulatif des activités à réaliser !
Rappel :
Plusieurs espaces ont été créés pour permettre les échanges, selon vos préférences et envies. Nous vous laissons tester ces espaces. Pour ne pas se perdre nous pouvons tout de essayer de donner quelques repères mais vous êtes libres de les utiliser selon vos souhaits :
L'ESPACE FORUM :
- Le fil de discussion de la "session 2" permet de présenter et d'échanger autour de nos expériences, avis et définitions de gestion de projet.
- Le fil de discussion "FAQ et questions techniques" favorise l'entraide technique.
- Le fil de discussion "projet MOOC" rassemble vos projets ce MOOC.

L'ESPACE GROUPE : L'espace Groupe permet de résoudre ensemble un problème donné.
L'ESPACE MICROBLOG : Cet espace est libre, vous pouvez partager ce que vous souhaitez en utilisant la balise **#sMOOC3** pour que vos publications soient visibles.
LES BALISES : Les balises permettent de suivre les échanges et publications autour du MOOC, la balise générale du MOOC est #sMOOC3 et celle du premier groupe français #sMOOCsBsGroupe1.
LE GLOSSAIRE : Cet espace permet d'élaborer ensemble la liste des définitions et ressources autour du sujet. Il peut aussi permettre de développer certains points, comme les avantages et inconvénients à développer un sMOOC.
Et bien sur les réseaux sociaux Facebook etTwitter: #sMOOCsBs.
Merci à vous !

Figure 2. French good practice

LO SPAZIO FORUM :
- Il forum della sessione 1 è finalizzato alla conoscenza degli altri partecipanti e alla condivisione di esperienze, opinioni e definizioni.
- Il forum dedicato alle FAQ ha l'intento di fornire l'assistenza tecnica.
- Lo Spazio Discussione MOOC e-Teacher è finalizzato a condividere le vostre idee di progetto MOOC.

LO SPAZIO GRUPPO : la sezione Gruppo consente di risolvere insieme un problema proposto o per condividere riflessioni con gli altri membri del gruppo.
IL MICROBLOG : è uno spazio libero, che puoi usare per condividere idee, dubbi e definizioni utilizzando l'hashtag #sMOOC3 per poter rendere visibile ciò che scrivi agli altri partecipanti al corso.
I TAG : sono le parole chiave che permettono di seguire gli scambi e le pubblicazioni riguardanti l'intero MOOC, l'hashtag generale è #sMOOC3 e quello del gruppo italiano #sMOOCsBsGruppo1 .
IL GLOSSARIO: Questo spazio permette di sviluppare congiuntamente un elenco di definizioni e risorse intorno al soggetto. Può anche aiutare a sviluppare alcuni punti, come ad esempio i vantaggi e gli svantaggi per sviluppare un sMOOC..
è infine possibile utilizzare i social network Facebook e Twitter: #sMOOCsBs.
Non dimenticare che la conoscenza deve essere costruita in modo collaborativo; quindi è importante partecipare alle attività negli ambienti che ti proponiamo. A presto.
Staff ECO

Figure 3. Italian copy of good practice

In a similar serendipitous manner, while looking for means of optimizing facilitation in the management spaces, the French coordinator noticed that the Italian team was suggesting the creation of new *hashtags* (for instance #PLB) to federate participants. This casual observation made while browsing the messages in the forums finally led to similar practices being adopted by the other facilitation teams. This benefited also the collective since the #sMOOCsBs enabled everybody to follow the exchanges in all languages, thus priming attention to the whole community.

However, in spite of the use English as the lingua franca (while there was only an English team), not all teams integrated at the same speed. The need for intercultural management and intercultural participation appeared as important skills and competences to put in place for further experimentation.

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Empathy: being conscious of the situation of others

Empathy is central to reducing intercultural barriers. It is the ability to recognize the feelings and the standpoint of others and also to react emotionally and cognitively to other people's emotions and situations (Brome, 2009). Interculturality creates opportunities for empathy as it provides access to different national or professional frameworks and exacerbates the exploration of alternatives. All the participants are in relatively horizontal relations, with not one particularly above the other, thus fostering situations conducive to constructive compromises.

All contributors to the *Step by Step* had already experienced working on ECO MOOCs in their national contexts. They had already been confronted to decision-making, problem-solving and community management in accordance to ECO's participatory pedagogical design. So they each brought their experience to the sMOOC and their own reflexivity, which made it easier to feel empathy with the situations that came up. It also made it easier and faster to take decisions (no need to go over the reasons, the consequences, the rationales…) without necessarily verbalizing them. But it also allowed the contributors to discover the behaviours, decisions, attitudes made by others in similar circumstances and to go over them to understand the context and the reasoning behind the ultimate choices.

Similarities in the team creation also brought rapprochements with individuals that were not foreseen. Some participants started with the feeling that they were asked too much or that they were "solo" as in the German case. But due to continuous exchanges, they soon realized that most teams had a feeling of having to respond to many demands in a complex situation of constant pedagogical innovation. By realizing that they were not alone and that others felt alike, the level of engagement and of understanding changed as they felt they had been understood and they had understood others.

The sMOOC *Step by Step* tested everybody's capacity for empathy as it was a a-typical situation that required to be available for work at odd times (week-ends, nights,…). This had incidences on family situations, on leisure activities, etc. It resulted in reinforcing solidarity across the teams as some rapprochement was induced by having to make decisions at unexpected moments. Better understanding of habits, ways of work, cultural values was gained by such insights.

Tolerance of error: being able to change roles and to find playful solutions Raison

Attention and attribution are also important in taking care of error and knowing how to manage it. Cognitive biases are part of intercultural relations and zones of tolerance to such biases can actually be positive, especially when dealing with uncertainty as is the case in sMOOCs (Haselton & Galperin, 2013). Some situations of the Step by Step showed that some responses and resources were not adapted for all cultures. For instance, sending mails massively in one language as was one by the Spanish team at the beginning only served to show the frustration of the other contributing teams. They felt that these messages were ill

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suited to their learning situation. The management team reflected on this and organized their messages in such a way as to satisfy the Spanish teams and the others, and improve their national learning situations (see below). The presence and use of some social media rather than others also illustrates the tolerance of error: some teams first perceived that using commercial networks external to the OPENMOOC platform was abusive; but after several exchanges they came to the collective decision to add them to their cultural practices, having measured the pros and cons.

Figure 4. From one massive message in one language (Spanish)

Figure 5. To modified massive message in collective objective in all languages

Tolerance of error was particularly put to the test between the pedagogical teams and the engineering teams of ECO. At first the teaching staff was obliged to accept the platform bugs, the technological inconsistencies and errors. They finally reached temporary consensus to "carve out" solutions that would respond to their specific pedagogical needs (like including images in documents when the platform functionalities did not facilitate this insertion). Some of the frustrated participants ended up being *advisors* to the engineers, translating the other teams' needs and encouraged by them. Their role changed to *improvers* of the learning experience mediated by technology. This is a fundamental change of role in sMOOCs: one does not render a service as much as one produces an experience that all the other participants can influence all along the process, for the benefit of the collective activity. As everybody sees the work of the other teams, all the participants end up accepting the gaze of other professionals and they change their perspective: it is no longer surveillance but help. This

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tolerance also makes it possible to accept judgment and criticism as important parts of the iterative process. However, communication skills are very important so as to express these without hurting people's feelings and enabling them to incorporate criticism into their own work ethics.

Tolerance of ambiguity: being capable of perceiving differences in others' values

Tolerance of ambiguity has been defined as the tendency to perceive ambiguous situations as "desirable" instead of "sources of threat" (Budner, 1962). In the *Step by Step*, facilitation messages can require very short delays and bring up expectations of quick adaptation and contextualisation, that appeared at the beginning of the process as very incoherent as the participants had not adjusted to it yet. So some missed the main objectives and did not perceive all the dimensions of being part of an intercultural pedagogical team.

The pedagogical design evolved progressively over the three iterations. Many back and forth happened to revise prior proposals and resources. Participants needed to keep an open or neutral perspective and to accept external gazes to validate a choice that was not always pertinent at the beginning. When each team found its footing in the community, then the process was made easier as exchanges and modifications were more easily tolerated, with much reciprocity. This was particularly the case with the order of sessions in the sMOOC that did not find unanimity at first and then was agreed upon.

Pedagogical contributors realized the value of accepting to make space for others. The ideas for activities, contents and resources stemmed from bi-cultural teams, and the others had to *accept* their propositions and then feedback for improvements for the next iterations. Such notions as trust and competence came into play, as participants were aware that they engaged themselves and their community. Some people were called upon because they had transversal competences, others because they had a more comprehensive perspective. For instance the arrival of a new facilitator in the English team took some adjusting time, until he became one of the major references for translation.

Decentring process: being distant in relation to oneself with new roles

In cognition, decentring is the ability to consider one's thoughts and feelings as temporary events in the mind and to see them as objective and not subjective. "The reality of the moment is not absolute, immutable, or unalterable..." (Safran & Segal, 1990; p.117). In intercultural situations this allows for reappraisal of comments or situations without feeling diminished or ill-considered, which reinforces empathy and tolerance.

Decentring also ensures that there is no avoidance of the situation as it is perceived as mutable, iterative and not everlasting. It makes it possible for all participants eventually to find their place. It entails the capacity to be self-reflexive and to put decisions and content at a distance and under the gaze of others.

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The analysis of the satisfaction questionnaires submitted by the participants has allowed decentring because they lay the emphasis on the value of the service provided, on the learning experience offered, as well as the social, technical and pedagogical experience. The deliverables and the meetings are also means to gain distance and reflexivity. The collective debriefing of situations, behaviours, responses leads to the sense that the sMOOC is a temporary event, with room for improvement.

The possibility of identifying the members of the teams, with pictures, photographs and avatars also enabled decentring as each participant could identify others and himself or herself in the techno-pedagogical framework (see below). Thus the translation of a message for facilitation was no longer perceived simply as a simple translation but as a message belonging to the whole facilitation process. This in turn has led to optimization as each person knew the value of producing the same message across all languages with the least possible delay, for the sake of the whole team.

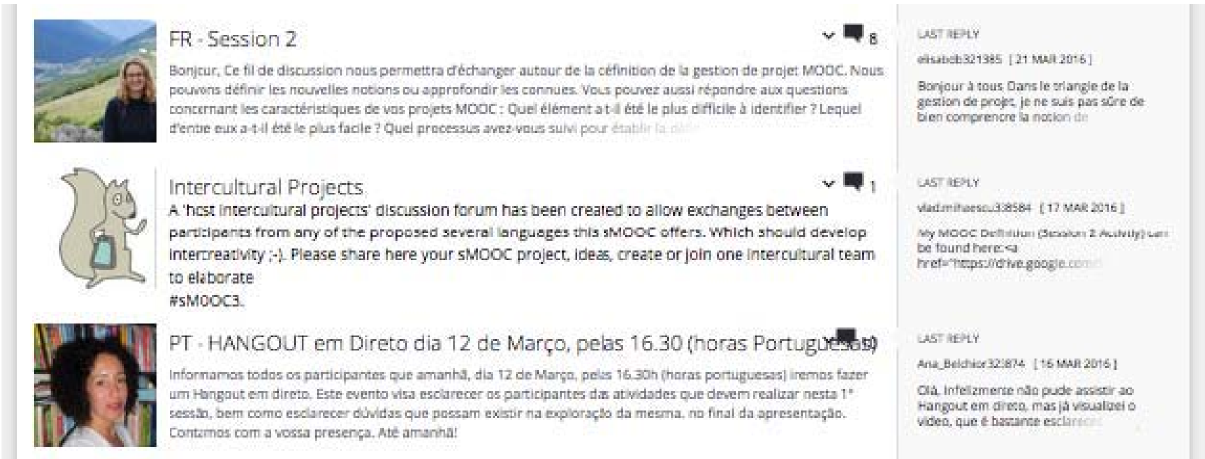

Figure 6. View of mixed forum

In conclusion, the implications for intercultural management and intercreativity are apparent. The Agile Method is partly dependent on collaborative tools and competences. The Step by Step sMOOC proved to be a performance in open interculturality with strong cognitive processes at work: interventional or accidental focus, empathy, tolerance of error, decentring, tolerance of ambiguity.

The intercultural management is a process thanks to collaboration and cooperation as suggested by Cerisier. It enables exchanges of information by all the members, and develops a collective intelligence focused on specific tasks. The ECO project also supports (Bartel & Saavedra, 2000) this collective intelligence enabled by digital tools and affordances and it is a source of performance that creates value. Digital tools have embedded and implicit managerial potential that needs to be deployed and appropriated explicitly by the team members The managerial potential is turned in working reality when it makes various gazes and focuses possible.

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However this potential also needs to incorporate cultural and cognitive factors to manage uncertainty, innovation and foster interculturality and intercreativity. Cognitive and affective processes need to be made transparent and be shared across cultures and learning strategies. They are part of a pedagogy of participation that mixes social-constructivism, connectivism and collaboration. Intercultural competencies are an added value and create value.

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MOOCS FOR MOTIVATION: PROMOTING STUDENT ENGAGEMENT IN HIGHER EDUCATION STUDIES

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Abstract

In this paper we explore the relationship between factors that affect learner motivation to study and the potential value of massive open online courses (MOOCs) to stimulate student engagement with their core higher educational studies. The research has used a mixed methods approach to uncover quantitative and qualitative insights from a group of undergraduate level student ambassadors. In the first part, we explore whether using MOOCs as a supplemental study activity could enhance their engagement, motivation and confidence. In the second part we examine the pros and the cons of MOOC-style curricula and which student literacies, digital skills and level of self-regulation required to engage successfully with MOOCs.

Introduction

Student engagement in Higher Education is a challenge for most institutions, not only in the UK but in Europe and internationally. We have explored a number of factors that affect students' initial and overall motivation to learn, and their relationship with the positive impact that following a massive open online course (MOOC) may have on engagement with institutionally based study. Initial insights into this investigation were provided by research from the Faculty Survey of Student Engagement (FSSE, 2013) and the Beginning College Survey of Student Engagement (BCSSE, 2013). These studies indicated the following were important in engaging university students: the delivery of challenging courses; effective learning strategies; encouraging peer learning; courses which improved student understanding via high-impact practices; and collaborative campus environments. Other forms of engagement have been studied elsewhere, for example, the time spent studying and gaps in study skills. Here Norman and Hyland (2003) found that international students experienced low levels of confidence in their academic ability when compared to more traditional entry students. As universities have growing concerns about the engagement of students in online courses, we find that an increasing number of US institutions argue that both learning with technology as well as courses that use technology have a positive association in indicators related to academic challenge (NSSE, 2013).

One of the reasons that students perform better and are more engaged is when they feel motivated, confident and challenged by their studies, and are rewarded by success (Kuh et al., 2011). This could be achieved through the raising of aspirations for core study via the successful completion of a short MOOC from a well-known institution. The positive emotional effect of studying within a diverse global community of learners and the value of the ensuing course completion could potentially boost student success on their core courses.

Currently there are no reports on the impact of additional study through MOOCs on student motivation, confidence and engagement in their core degree courses. That said, there are already examples of MOOCs being used within Higher Education Institutions to supplement undergraduate in-house courses, for example at the HAN University of Applied Sciences in the Netherlands (Köppe et al., 2015). However there are concerns about the increasing number of Higher Education students, particularly those from non-traditional backgrounds, regarding their confidence in their own ability to succeed (Pokorny & Pokorny, 2005). The University's UK's report (UUK, 2013) on MOOCs emphasises supports the need to investigate this aspect of MOOCs further and uncover "what part can online models of delivery play in improving the quality and value of online and traditional courses for students, employers and society". Furthermore, effort should be dedicated to determine how an institution can add value to the educational experience of students beyond the standard MOOC platform, and facilitate access to social and professional networks (UUK, 2013).

One primary attraction of MOOCs is the offer of *free* study. Free in a monetary sense but is also free from the pressure and risk associated with traditional paid for and accredited courses. This freedom of choice can be productive for both intrinsic and extrinsic motivation and could potentially have a positive impact on students in their core higher educational studies within their institution. Other research also indicates that motivation through studying MOOCs is an area of interest, particularly when participants are motivated by their passion to learn, and not purely for the quest of qualifications and certification.

More recently there has been a growing interest in understanding what knowledge skills and attitudes are required to succeed in online courses, particularly in light of the reported low completion rates for MOOCs (Jordan, 2014). Analysing the experience of learners on "Nand to Tetris" (a MOOC-like course), Shimon Shocken identified the *hacker mentality* as the essential ingredient for the successful students (BIS, 2013). In other research, self-regulation has been considered a critical factor for student success in MOOCs (Gau et al., 2013; Gutiérrez-Rojas et al., 2014). These are the "self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000; p.14). Self-regulating learning is a proactive and continuous course of progression which involves the learner setting specific, realistic and challenging goals after which they monitor, assess and reflect on their learning practice and constructively improve their method throughout their learning (Azevedo & Cromley, 2004). It is a self-directive process that facilitates a transition of mental ability into academic performance (Zimmerman, 2008). The importance of self-regulation has been emphasised greatly in recent years. The inability to self-regulate becomes a barrier to students during their online learning because they cannot access all of the components within the course (Jacobson & Archodidou, 2000). Zimmermann describes three phases: (a) planning; (b) performance; and (c) self-reflection; which are interconnected through affective, behavioural and cognitive sub-processes. These sub-

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processes range from: cognitive factors (motivation, interest, self-reflection and self-evaluation), to behavioural factors (goal-setting and learning strategies), to self-efficacy and self-satisfaction (Fontana et al., 2015).

In summary, it seems that the educational benefit of MOOCs may extend to providing intrinsic and extrinsic motivational factors that can have a positive impact on a participant's core higher education studies.

Research aims

The two principle aims of this study are:

1. To explore the impact of using MOOCs as a supplemental study activity on students in terms of enhancing their engagement, motivation and confidence with higher education studies.
2. To discover the positive and negative aspects of a MOOC-styled curriculum, and in particular, to find out which level of student literacies, digital skills and self-regulatory practices are required to engage successfully with MOOCs.

Expected outcomes

The outcomes of this research will be used to create a curriculum roadmap for the incorporation of online learning through MOOCs. The results will also be used to identify student needs in relation to learning skills, previous experiences of online-based study, digital skills, level of self-regulation required, and the scalability and applicability of a *blended MOOC* approach for all student study. Indirect outcomes from the study will be recommendations for improvements in the design of MOOC-style curricula with the appropriate instructional design of the techno-pedagogical environment in relation to the students' educational needs, prior learning, ability to self-regulate, and the institutional support mechanisms.

Methodology

Rationale

Self-Regulated Online Learning Behaviour in an individual depends not just on the learner, but on the environment in which learning is taking place (see Bernaki, Aguillar and Byrnes (2011) for a comprehensive overview of the relationship). For example, an individual is unlikely to learn in an environment that complicates the learning process. Therefore, by developing the understanding of the pedagogical features for an effective learning environment, we can facilitate a successful teaching and learning process.

Research Design

The *explanatory sequential* mixed method research design has been used. This provides a defined procedure for collecting, analysing, and mixing both quantitative and qualitative methods (Creswell & Plano Clark, 2011) in order to provide a better understanding of the research problem and research questions than either method deployed individually. This model consists of two phases:

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- Phase A: Researchers collect quantitative data and results which will provide a general view of the research problem;
- Phase B: This is followed by data collection through qualitative means that will further explain or elaborate the quantitative results.

The sample population in this study were from the university *widening participation* student ambassadors. These comprise undergraduates from a range of study years from level 4 to 6 and studying a range of undergraduate programmes.

Research Process

A nine-stage research process was used based on the explanatory sequential design described above. Initially, the research team determined the feasibility of the mixed method study (step1). Afterwards they identified the rationale for the selected methodology (step 2) and then, the data collection strategy was developed (step 3). The quantitative and qualitative mixed method research protocols were agreed (step 4) and a survey with open and closed questions was designed and loaded into an online questionnaire application. The link to the survey was sent by e-mail to the sample population of University of Surrey *student ambassadors* (step 5). 61 students responded to the questionnaire from a total sample population of 180. The quantitative data from the closed questions was collected and statistically analysed, with content analysis used for the open question responses (step 6). Finally, a world café workshop (see below) was run to investigate participant views on the advantages and obstacles to online learning. The outputs were gathered via observer note-taking and means and the qualitative data was organized and analyzed (step 7). Researchers then reflected on the quantitative and qualitative data sets, and discussed of the research results (step 8) leading to a report with conclusions and recommendations emanating from this multiple phase study (step 9).

Research Instruments

- For phase 1: An online survey was designed to measure a range of sub-processes across four phases of self-regulated learning in Higher Education and more generally in online education. The survey instrument comprised a structured set of 22 questions, each focused on the phases and sub-processes of self-regulated learning from Zimmerman (2000) and of the beliefs, usage and added value of technology in study.
- For phase 2: A *World Café* workshop was designed as a simple, effective and flexible format for hosting group dialogue. (Brawn & Isaacs, 2016).

Research Analysis

A convergent analysis design approach was used in this mixed method research. An analytic and interpretive procedure followed on from the data consolidation. Here, qualitative and quantitative were data combined to form new interpretive categories and the original quantitative categories were compared with qualitative themes to form new quantitative variables or indicators (Caracelli & Greene, 1993).

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Results and Discussion

In this section we present the initial results from the quantitative research analysis. The results in this first section are linked to the three basic phases of the learning process – *forethought*, *performance* and *self-evaluation*.

- With regards to *forethought* and more specifically how they set goals, 66% set personal standards for their learning, 61% set short-term (daily or weekly goals), 54% set long term goals, 55% set goals to help manage their study, 36% set realistic deadlines and 2% of participants set a more specific goal for high grades.
- One key aspect of the *performance* phase is strategic planning. One measure of strategic planning is for students to understand how they learn best. We found that 67% of students organise study time to meet goals and 53% of students follow the structured methodology provided by the course to solve a given problem. Furthermore 50% of students recognise, adapt and apply strategies that have worked for them in the past.
- To understand the value students give to critical thinking strategies during the *performance* phase they were asked how they develop their critical thinking skills. Most of the participants (64%) agreed that they use course resources as a starting point to develop their own ideas. and 47% agreed that they connect their own ideas with course content.
- Another indicator of student performance is the level of student interest towards a course. When asked, 43% of participants agreed that the most satisfying aspect of a course was to develop a thorough understanding of course content and 48% of participants agree that they preferred engaging tasks which facilitate their learning.
- When participants were then asked whether they prefer learning material that arouses their interest - even if it is challenging, 37% agreed and 46% strongly agreed that providing challenging material enhances their interest in learning.
- The *self-evaluation* phase represents the ability of students to compare and evaluate their learning objectives with their learning outcomes. 61% of participants agreed that they measure their progress in relation to their intended goals. Moreover, 29% of the participants agreed that they evaluate their activity after completing a task.

The next stage of our analysis was to explore the development and utilisation of *literacy and digital skills*, and the extent and level of *self-efficacy*. The key results were as follows:

- We asked about student *literacies,* in order to understand which type of skills they had developed during previous study activity and whether these skills were applied in future learning activities. 59% responded that past experience had prepared them for new learning challenges, 55% of participants cope with new learning because they rely and trust in their ability and 43% prepare for demands they will face in the course. An average of 33% of participants believed their most relevant skill is the ability to find new methods to overcome a challenge. Furthermore, most students believe time-management to be the most important skill for efficient learning. Other respondents

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found collaborating and discussing material in groups facilitated a better learning experience. A fewer number of students feel the revision of essay plans, setting realistic deadlines and self-discipline to be the most effective skills.

- However, self-discipline is a general term that could include, and lead to improving time-management and other skills mentioned here. Students were also asked to identify their effective learning method and 90% of them responded that to make *notes to become organised and develop greater understanding* is the most effective skill. 65% prefer to translate new information into own words. It was interesting to discover that 29% of participants actively change strategies when they perceive that they are not making progress in their learning. In relation to increasing retention of learning, two students preferred to present information visually (drawing or poster) or in an audio format (audio memos).
- In relation to *digital skills*, 63% of participants agree that good digital skills are fundamental for learning and no respondents disagreed. In addition, 33% of the respondents agreed that they needed to develop their digital skills in order to facilitate their learning with 24% who were happy with their current level of digital skills.
- We moved on to explore the student perspective and understanding of *self-efficacy*. We found that 57% of the participants believed that, to a moderate extent, self-efficacy leads to successful learning, while 2.5% of participants believed self-efficacy only plays a small role in learning success.
- The last question in this section of the survey attempted to understand how students *reflect after action*. 50% of the participants agreed that they often consider how their learning fits into the 'bigger picture' of their work or practice. Furthermore 57% of participants agree that they try to understand how what they have learned impacts their work or practice.

The final part of the survey explored students' expectations of online education and MOOCs in particular.

- Initially participants were asked what online education means to them. Most participants defined online education as "using online resources". Others felt the "learning or teaching through online courses" best explained this term. Some participants associated online learning to online testing methods such as quizzes and assessments and flexibility to their learning routine. Lastly, a small number of participants mentioned "mixed media" would be used in online learning to facilitate learning.
- Participants were then asked about their exposure to any online education experience. 11 participants reported using online training programmes for employment purposes including taking online courses and subsequent assessments. 12 of the participants reported having no exposure to online learning environments though a small number had used online resources. 6 participants have participated in open online university courses and have reported beneficial experiences such as having the opportunity to study at their own pace.

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- Students were asked to give examples of technologically-based learning. The final question simply asked participants to list any tools, applications or services they use online to support their learning. Most of them have used Wikipedia, YouTube, their university's Virtual Learning Environment and online databases for journals (including Google Scholar) for study purposes. Some of them have also reported to using Twitter and Facebook to support their learning. Also mentioned were blogs, news websites, mobile phone applications, Google Documents, video recording, mind maps and forums to support of learning
- Participants were asked an open question to understand the student perspective on how online courses such as MOOCS, could offer added value to their learning. Almost half of the participants felt online education could only bring direct benefit in terms of the learning experience itself. Most of the participants agreed that online learning offers the flexibility to work from home and facilitate independent learning. Some of the participants believed online learning will make it easier to find relevant information for their course and will act as a good support for lectures especially during revision periods and when reviewing course content.
- The participants were asked a more specific series of questions in relation to their preferred characteristics for an online environment that would motivate them to learn better. 68% and 27% strongly agreed and agreed respectively that online learning environments should be accessible. 49% and 46% of participants strongly agreed and agreed respectively, that the online learning environment should be explorable and 70% strongly agreed that course content and navigation should be clear. When asked whether the course should be friendly, 44% of participants strongly agree and 46.34% of participants agreed with the statement. An average of 56% and 34% strongly agree and agree respectively that they need an interactive environment and 61% of participants strongly agree that online environments should be interesting. Lastly, 36% and 51% of participants strongly agreed and agreed respectively that feedback should be offered in online learning environments.
- The final indicator was to understand which technological tools students would select to best support their online learning. 81% of participants believe tools that will support the understanding of information (interpreting, summarizing, explaining and classifying) are the most beneficial, for example e-dictionaries, authoring tools and mind-map tools. 76% of participants feel tools that will support the memorization of information are important (i.e. recognizing, highlighting, bookmarking and listing), for example, video recording, tables, graphic tools, images and graphs. 54% of participants felt it is important to have tools that support them to evaluate the results of their analysis (i.e. checking, hypothesizing, critiquing, experimenting, judging and testing), for example shared documents, authoring tools, blogs, and social media websites. 49% of participants believed most important for them in online learning environments is to have tools to support the analysis of data (comparing, organizing, linking, deconstructing, integrating, validating), for example authoring tools, shared documents, tables, mind maps, e-portfolios and e-surveys. Next, 43% of participants selected the tools to support the application of information (implementing, carrying

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out, uploading, editing), for example in blogs, Facebook, Twitter, authoring tools and online docks. Lastly, 27% of participants selected tools to support the creation of new data that rise from their study after their initial learning process (designing, posting, filming, constructing, planning, production, inventing and publishing) for example storytelling, shared documents, authoring tools, journals and presentations.

Conclusion

The analysis of the quantitative data from the first phase of the study has provided a general overview of the research problem. The results have provided insight into primary engagement factors that underpin motivation in relation to studying and learning. For example, as we might expect, it I possible to achieve improved levels of extrinsic motivation by providing challenging course materials and engaging tasks that are relevant to the students' learning expectations. The participants in this study also reflected a range of skills in the areas of planning, performance and self-evaluation of their learning. These become significantly positive traits when considered in the light of online study in MOOCs where self-regulation and self-efficacy are critical to success. Research has already shown that student self-efficacy is positively correlated with self-setting of goals and goal achievement (Zimmerman & Bandura, 1994). Although many students do plan their study, it appears advantageous to actively encourage all students participating in online learning environment to set learning goals. This positive study behaviour resonates with the finding that many of the students do evaluate their activities after completing a task.

The data analysis also indicated that good digital skills are recognised as fundamental for learning. In terms of the online learning environment, the participants proposed several attributes that promote students engagement and motivation. Most importantly, the learning environment should be fully accessible, clear and *interesting*. Additionally the participants indicated that any online course should be understandable. In other words that the course content should be available in forms that allow them to memorise it, to evaluate it, to support the analysis of the information, and facilitate the creation of new information. Our preliminary data also appears to indicate that intrinsic and extrinsic motivations can shift during the learning experience. Here, cognitive evaluation theory, which examines the factors in learning environments which cause variability specifically in intrinsic motivation (Ryan & Stiller, 1991), may help provide further insights into this affect. We also note that a sense of autonomy and competence in their learning can highly influence the student learning experience. During the second phase of this project more analysis, specifically through qualitative data collection, will follow around these domains of interest.

Most of the students responded positively when asked about the potential impact that following a MOOC-style curricula could have on their learning. At this stage, there is some confidence that the level of abilities reported in the three phases of the learning process (*forethought*, *performance* and *self-evaluation*) can be transferred to have a positive impact on successful online study (e.g. via MOOCs), particularly where it may be used as a supplemental study activity. The second phase of the project will further determine to what extent MOOCs

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may provide positive motivation, to enhance student engagement and develop confidence in their core higher education studies.

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MOOCS AND CHANGE DYNAMICS IN HIGHER EDUCATION

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Background, aims and scope

Selwyn (2013) highlights the importance of national governments' role as to mediate and adapt so-called incoming forms of educational technology. He even suggests that national governments may act as *local interpreters* and *cleansers* of incoming global models of educational technology provision and practice (Selwyn, 2013). The implementation and interpretation of the concept of MOOCs may represent an interesting case in this respect. Most higher education institutions (HEIs) in Norway are public and education is free for everyone. Currently there are 8 universities, 20 university colleges and 5 scientific colleges owned by the state. In addition, 23 private higher education institutions receive government support (these numbers are about to change due to ongoing processes of merging HEIs). Moreover, Norway has a long tradition for distance online education, and several initiatives regarding blended learning have emerged during the last decade (Tømte & Olsen, 2013; Norgesuniversitetet, 2015).

In 2015, there were 21 MOOCs registered in the national portal www.mooc.no in Norway, most of them covering various aspects of continuing education. In most cases, teacher staff within HEIs designed and developed these MOOCs. These teachers held a particular interest in online and blended teaching and learning. Moreover, few of these MOOC-initiatives connect to institutional strategies within the HEIs. Neither are these MOOCs initiated by internal university stakeholders, or by governmental bodies. An exception is the MOOC in Mathematic-didactic, initiated and funded by the government, and with academic and administrative affiliation within two HEIs and their teacher education departments. This particular MOOC offers continuing education in Mathematics mainly at 5-10th grade to teachers who work at schools around the country.

Based on this particular MOOC for math-teachers, the present paper aims to explore if this MOOC may enhance pedagogical innovation in the participating/actual teacher educations; and in which ways it may serve as a driver in order to enhance knowledge development in terms of new teaching models or alternative teaching models within the two participating HEIs. The paper presents preliminary findings from an ongoing formative evaluation study of this MOOC, running from September 2015-September 2016.

The following sections include a short research review, mainly focusing on literature on institutional approaches to MOOCs, a short introduction of the formative evaluation study and how this particular paper relate to this, including sources of data on which the present paper are based on. The next sessions covers presentation of preliminary findings and relate these to relevant studies from the international body of research.

Research review

Research has highlighted the difficulties of defining a MOOC compared to conventional online courses (Bates, 2014; Tømte, Fevolden & Olsen, 2014). An initial challenge is that there are different definitions on MOOC, mainly due to their various nature when it comes to structure and pedagogy (Hollands & Tirthali, 2014). One acknowledged approach is to distinguish between two types of MOOC, cMOOCs, and xMOOCs, often similar to standard online courses but open and with large-scale student numbers (Downes, 2013). Even if several understandings and interpretations exist of what constitutes MOOCs, most include aspects of scaling, technology; target groups and motivations for developing a new MOOC (Allen & Seaman, 2015; Jansen & Schuwer, 2015). In this paper, we focus on a particular type of MOOC, which has been used for continuous educational purposes, combining advantages of face-to-face online learning situations and advantages of online-learning: small open online courses (smOOC) or small private online courses (SPOOC) (Hayes, 2015), which are limited to a certain number of participants, and with the requirement of a participation fee.

During the years, MOOCs have gained ground around the globe. While emerging from the U.S., the concept has reached the Middle-East, Africa, Australia, New Zeeland and Japan several European countries to mention some (Adham & Lundquist, 2015; Bonk, Lee, Reeves & Reynolds, 2015; Jansen & Schuwer, 2015). Researchers demonstrate how countries adopt and adjust MOOCs to their cultural, social, political, economic situation, and to their technological infrastructure and organization of Higher Education. For example, when comparing MOOC strategies in Europe and U.S., researchers found significant differences in how the U.S. and European countries approached the impact of MOOCs and their understandings of the efficiency of digital education and online learning (Jansen, Schuwer, Texeira & Aydin, 2015). One significant difference was how HEIs in U.S. and Europe considered the potential of MOOCs as sustainable method for offering courses. Another observation included perspectives on finance and scalability dimensions, these were seen as important in the U.S., but not as a primarily objective in European HEIs. Moreover, in Europe, the emergence of MOOCs seems to have revitalized the attention towards online learning within HEIs (Teixeira, Volungeviciene & Mazar, 2014). Furthermore, in some countries, such as Norway, the government has also had an active role in the developments of MOOCs. For example as initiating new MOOCs, as exemplified in the present paper, by facilitating adequate technological infrastructure to the higher education sector, giving financial support and by overall engagement in debates on accreditation and the like (Ministry of Education and Research – NOU, 2014).

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Schuwer and colleagues (2015) studied how experienced open and distance learning (ODL) leaders from several European HEIs with considerable experience with MOOCs approached and judged opportunities and threats of MOOCs in HEIs. They found that most of these are on the macro level, including accreditation, (ECTS), innovation and availability of multiple platforms (Schuwer, Gil-Jaurena, Aydin, Costello, Dalsgaard, Brown, Jansen & Teixeira, 2015). Interestingly, these issues are sometimes interconnected or representing both sides. For example, MOOCs may enhance institutional collaboration, and the ECTS-system may serve appropriate for accreditation by ECTS of MOOCs. However, this particular system of ECTS is also judged as making it difficult to bridge non/informal and formal education. MOOCs may bring innovative and alternative pedagogical models into HEIs; but this may also be a difficult process due to too much regulation within the institutions.

The study: A formative evaluation of a MOOC-like course addressing math teachers in Norway

Data collection

The original study is an ongoing formative evaluation study of a MOOC-like course addressing 5th to 7th grade-mathematics teachers in Norway (September 2015 – September 2016) commissioned by the Norwegian Centre for ICT in Education. To investigate a broad range of topics on two different levels, user level (teachers) and governance level (funding; higher education institutions cooperation with project leader), we triangulate both quantitative and qualitative methods and data. Data collection included semi-structured interviews with teachers, school leaders, pupils and higher education institutions providing classes lasting around 30 until 45 minutes each, observational data of participating teachers in online study groups, document analyses (strategic documents) and a teacher survey.

Data analysis

The present paper emphasize preliminary findings based on semi-structures interviews with stakeholders and coordinators within the two higher education institutions responsible for the MOOC-like course, along with semi-structured interviews with stakeholders from the government side. Issues raised within the interviews included background for participation; internal organization and tasks; financial perspectives, collaboration within the institution and with the partner institution and the government; academic and administrative perspectives on pedagogical solutions within the MOOC; routines for knowledge sharing about the MOOC within the institution. During the interviews, the researchers took extended notes, further validated by audio recording. Furthermore, we sent the informants the interview notes for validation. We will discuss our preliminary findings from these interviews in the light of research on institutional approaches to MOOCs.

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Findings and discussion

In this paper, we study a MOOC initiated by the government. A governmental body in collaboration with two distinct HEIs, and their teacher education departments were in charge of the development of the MOOC. There was also a steering committee with members from the above-mentioned bodies and from the national committee for teacher education.

An interesting observation in our study involves aspects on what is a MOOC. The various stakeholders involved in the actual MOOC apparently seem to hold different conceptions of it; we observe statements such as “it is a MOOC; or a MOOC-like course”; or “it is an online course” and the like. Following this, the governmental bodies are concerned with exploring the possibilities that comes with MOOCs in terms of innovation and reframing informal/unformal and formal learning as various approaches towards continuing education and lifelong learning. We identify these expectations in the steering documents of the MOOC, and in our interviews. However, this point of departure is contrasting the views of the HEIs. These stakeholders are more likely to struggle with connecting the MOOC to ongoing activities within their institutions. The existing structure includes organize the course in terms of conventional distance online learning, including small student groups and tutors, and this structure has been applied to the particular MOOC as well.

We may interpret these diverse understandings and approaches of MOOCs in terms of different perspectives on quality issues, where different aspects of quality are interpret differently, such as quality of academic content; pedagogy; technology; communication and recruitment of students.

Initially, to enhance collaboration and innovation across institutions, the government required the MOOC to affiliate to at least to HEIs. Today, two HEIs and their teacher education departments are involved, with shared task related to administration and academic content, and coordinated by an overall governmental body responsible for the overall coordination and technological solutions. This approach, including several HEIs to host and develop one particular MOOC, seems to correspond with what seems to be considered as one of the opportunities within MOOCs as flagged by ODL-stakeholders, since it may enhance knowledge development across institutions (Schuwer et al., 2015).

However, our present observations regarding this organisation of the MOOC-like course are that it becomes difficult to place responsibility and to see how the MOOC connects with existing activities within the HEIs. One of informants at one of the HEIs says:

> *It is challenging to work together with so many involved institutions in one single project. Moreover, in this particular case, many of the involved persons have only a small share of their position connected with the project, which again has resulted in communication problems.*

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As demonstrated in the research literature, missing strategies on an institutional level to integrate MOOCs and link them to existing and mainstream activities within the institution may hinder their uptake (Schuwer et al. 2015). This might be the case in here, and we will pursue this when continuing our study.

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DO OUR MOOC'S WORK? CREATIVE WAYS TO ASSESS INNOVATIVE E-LEARNING PROGRAMS

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Introduction

Assessment of learners is important. Not only can we learn about the individual achievements of the learners, we can also assess the effectiveness of the learning scenario, be it the teacher, the curriculum, the learning environment etc. In this paper, we focus on the latter, in an attempt to assess some aspects of two, highly irregular online learning programs in math and science. Assessment of the learners before and after taking part in these programs can give us valuable information about the programs themselves (Boekaerts & Minnaert, 2003).

The programs, *Math By Mail (MBM) Online*, and, *Science By Mail (SBM) Online*, are e-learning courses (Jacobson & Archodidou, 2000; Welsh et al., 2003) in recreational math and popular math (respectively), for K-8 students, worldwide (Elran, Bar-On, & Elran, 2012). The main goals of these programs are to develop high-order learning skills and *out-of-the-box* thinking, and to boost curiosity and affinity to math and science – and it is this that we want to measure (Bar, Elran, & Elran, 2013).

They were developed and are managed by the Davidson Institute of Science Education, the educational arm of the Weizmann Institute of Science. Through a unique learning platform within a MOOC (Massive Open Online Course) -like scenario, thousands of young scientists and mathematicians, learn from, and collaborate with leading scientists and mathematicians (Shulamit & Yossi, 2011; Kotzer & Elran, 2012).

The courses are unique in many parameters:

- Each course facilitates diverse learning settings, blending synchronous and asynchronous learning: a series of e-booklets with many interactive tasks, quizzes and multiple question types, released every two months, weekly challenges with open questions, forum discussions and monthly synchronous face-to-face lessons.
- Participation in the course is elective. Still, the participants mostly have a homogeneous profile. Typically, they are high achievers interested in math or science. Albeit, they are highly dispersed geographically and differ culturally.
- The topics learned are non-curricular and, given the goals of the courses, the tasks are unusual and irregular.

- Over 4,500 learners participate in the programs.

It is extremely important for us to assess the added value of our programs, and learn whether or not they achieve their goals. In general, with regards to MBM and SBM, we want to know what unique knowledge, skills etc. do the students learn. We narrowed our focus to one specific question for each course:

1. Do the students who finish an annual MBM course, grasp the much broader concept of math being a vast body of knowledge and skills, hinging on philosophical, reflective thinking?
2. Does SBM enhance the individual student's *meaningful question asking* abilities?

In order to answer these questions, a new model based on performance assessment tasks (Boekaerts & Minnaert, 2003) was designed and implemented to identify the learning and thinking skills that were acquired during the year within the unique framework of MBM and SBM (Dalgarno, 1998). The rest of this paper describes the model and its application to MBM and SBM.

Math by Mail

Method

The assignment: We designed an assignment to test the way the learner grasps the concept of *math*. Participants were asked, at the beginning and end of the course, to compose a mind map of his or her answer to the question "What is math?".

The analysis: We compared the mind maps of the beginning and the end of the course with regards to four main aspects:

1. The number of associated ideas connected to the main concept in the mind map: A larger number of associated ideas represent a deeper acquaintance and broader understanding of the student with the main concept.
2. The diversity of representations in the mind map. Mind maps allow for different representations of ideas: text, images, symbols etc. A more diverse representation suggests a broader mental representation of the main concept.
3. The contents of the map: we tested the quality of the associated ideas represented in the map based on the following possibilities:
   - A higher level:
     - Ideas that indicate concrete mathematical thinking – such as a collection of arithmetic operators or descriptions of components and fields of math
     - Ideas that indicate abstract thinking or complex understanding of math
     - Ideas that indicate the broader concept of math as thinking processes

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- A lower level:
  - Examples ("Math for example is…")
  - Insignificant answers

4. The visual nature of the description. A more sophisticated description (i.e. complex vs. simple drawing) may correspond to the complexity of the thinking about the field.

Main results

Following are some of the main findings in our study:

- At the end of the year the participants used many more concepts than at the beginning of the year. 60% of the participants at the end of the year mentioned 10-28 concepts as opposed to only 33% that did so at the beginning of the year (Figure 1).
- Many more participants drew a mind map at the end of the year (92%) compared with the beginning of the year (15%)
- Less students wrote only lists of words or drew images that are not maps (9% of the participants at the end of the year compared with 85% at the beginning)
- When we compare the contents of the mind maps we see a significant difference between the periods with respect to the comprehension of math as a *domain of thinking* (42% at the end of the year compared with 0% at the beginning)
- At the beginning of the year the typical description was a list (54% of the participants) and at the end of the year this kind of description became negligible (6%) and the description with the highest frequency was what we termed a *sun description* – the main concept written in the centre of the map with *rays* extending to the associated ideas (86% at the end of the year as opposed to 19% at the beginning).

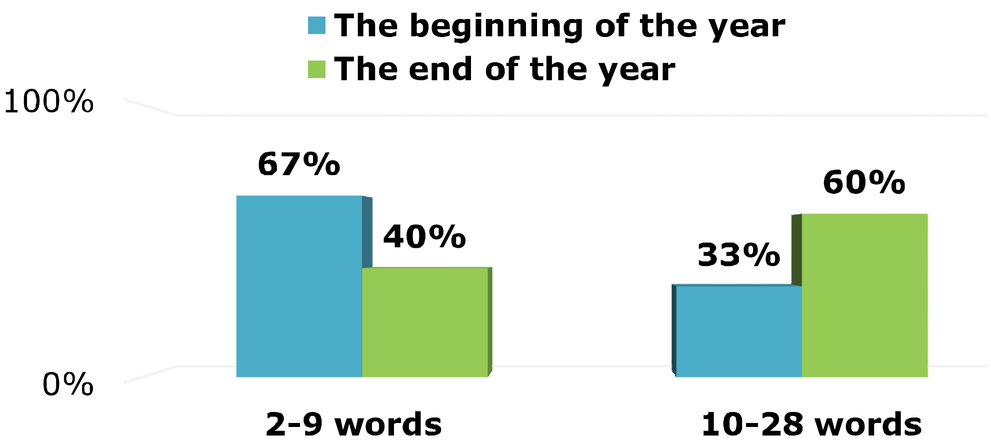

Figure 1. The number of concepts used by participants (grades 3-4) in their mind maps (comparison between the two periods)

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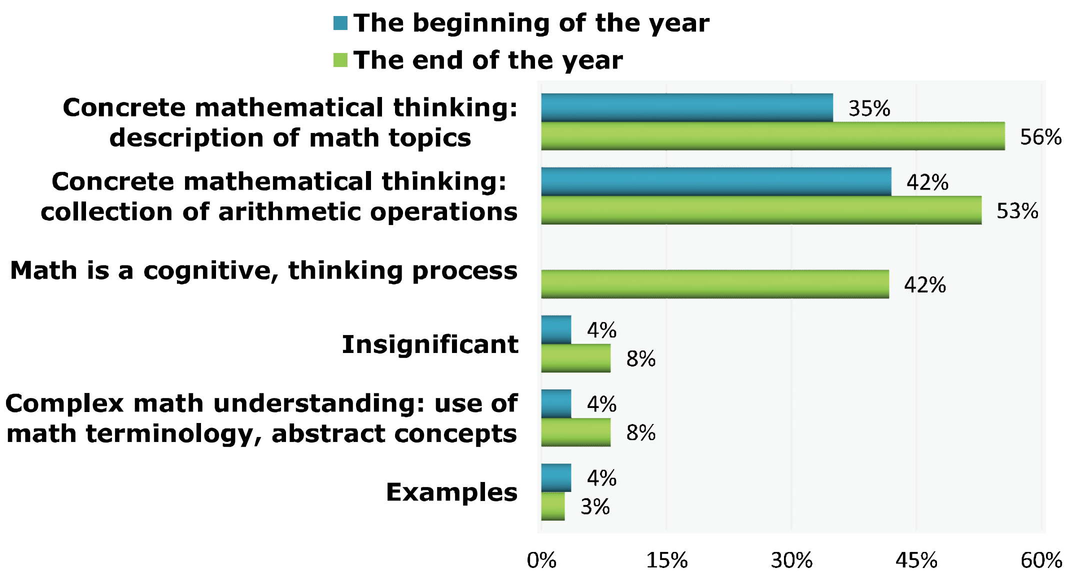

Figure 2. The content of the mid map created by participants (grades 3-4) (comparison between the two periods)

Figure 3 shows a mind map created by a grade 5 participant at the end of the year. The student drew complex connections between the ideas and expressed his understanding that math involves a cognitive thinking process by using phrases such as: *thinking out of the box* and *creative thinking*.

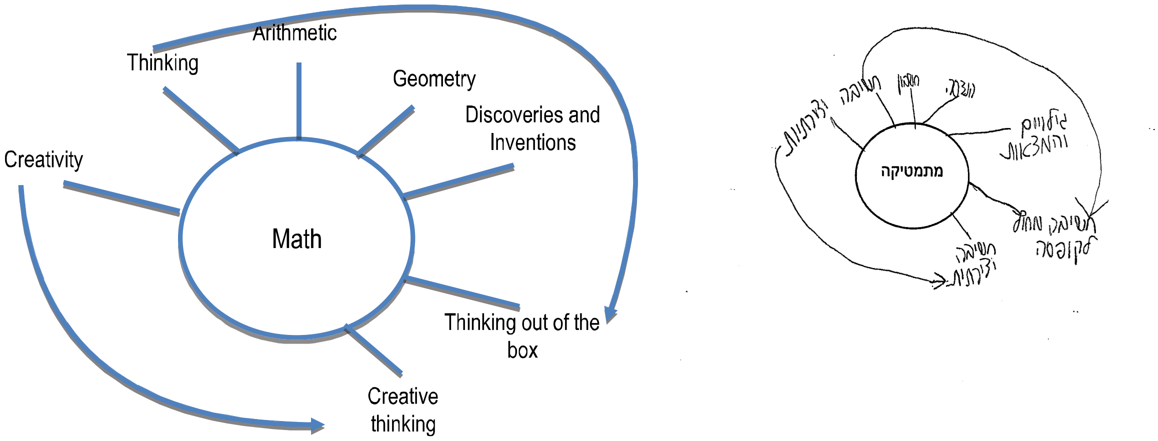

Figure 3. A mind map created by a Grade 5 MBM student (translated from original)

We conclude that in MBM, the program reaches its goals in respect to cultivating thinking and learning skills. At the end of the year the students that participated in the programs expressed richer concepts in their mind map, the structure of the map was much more complex and the possibility to connect between different concepts was more sophisticated.

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Science by Mail

Method

The assignment: We designed an assignment to assess the improvement in students' *meaningful question asking* skills. Both at the beginning and the end of the year, we presented the participants an illustration taken from a recent research. The illustration was accompanied by a short written text. The participants were asked to write as many questions as they could about the illustration.

The analysis: We compared the findings at the beginning and the end of the period with respect to two main aspects:

1. The number of questions asked – this indicates the level of confidence the participants have to ask questions and the legitimacy they feel they have to find as many answers as they can.
2. The quality and nature of the questions. We analyzed the contents of the questions asked by the participants and these questions were divided into different groups according to the level of thinking they indicated.

Main Results

At the end of the year we found substantial improvement in the students' *meaningful question asking* skills: they were willing to ask more questions (Figure 4), and the content of the questions indicated higher thinking levels (Figure 5).

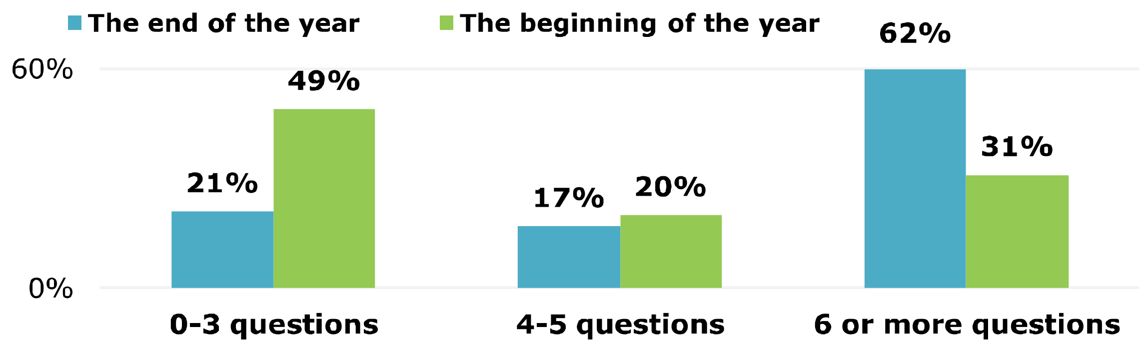

Figure 4. The number of questions asked by grade 3-4 participants (comparison between the two periods)

Regarding the quality of the questions, we found that the questions at the end of the year were of a higher standard than the questions at the beginning of the year. They were related more to the essence of scientific phenomena and less to historical information or research methods and techniques. For example, we saw more questions such as: "Why is that range of temperatures specifically those that sustain life on Earth?" as opposed to: "Are there more or less germs as we go deeper into earth?"

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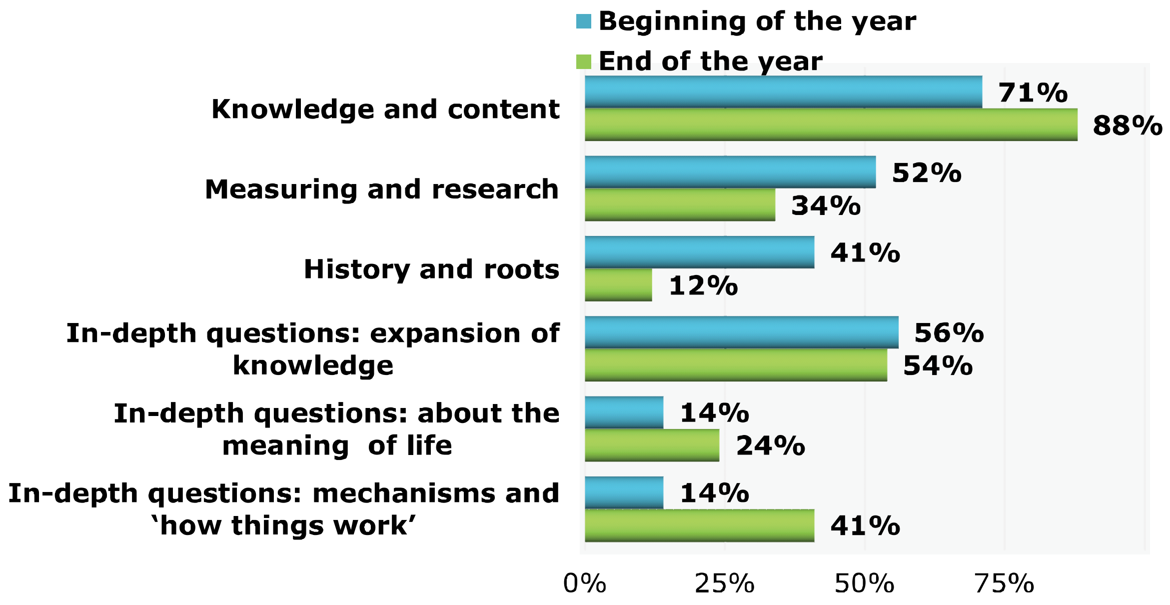

Figure 5. The types of questions asked by grade 3-4 participants (comparison between the two periods)

The findings show that SBM reaches its goals in the aspect of development of high-level, meaningful question asking skills: participants ask more questions and the content of the questions indicate higher thinking levels.

Summary and Conclusion

In this paper, we presented the innovative methods we developed to assess two extracurricular programs for high achievers and showed how these methods were applied. In particular, we found that the performance assessment tasks developed and delivered online to the participants, answered questions we had about the effectiveness of the programs, such as: Do the students who finish an annual MBM course, grasp the much broader concept of math being a vast body of knowledge and skills? (yes!), and, does SBM enhance the individual student's *meaningful question asking* abilities? (yes!).

Rather than focus on the individual results specific to MBM and SBM, we believe that the model suggested here can be adopted for many online scenarios (i.e. Azmon et al., 2012; Bar, Elran, & Elran, 2013). Performance assessment tasks of the type presented in this paper, are helpful to assess the effectively of programs for a large, homogeneous group of learners. They are easy to deploy online, especially for a large body of learners and hence are also useful for evaluating MOOCs. More research is required to form a larger body of tests that can be used to gain insight into similar learning environments. Perhaps we can develop a standard set of tasks that can be used to answer other important questions regarding the effectiveness of online and distant learning in general. The direction proposed can apply to other MOOC's and similar learning environments. Work along these lines is in progress.

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EXEMPLARS OF COLLABORATIVE LEARNING DESIGN IN ONLINE COURSES

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Introduction

Many instructors promote and support collaborative learning processes by integrating technology into their curriculums and establishing interactive environments. There is also a growing trend toward student-led collaborative learning where teachers adopt a supportive role and become learning resources (Wheeler, Yeomans, & Wheeler, 2008). Collaborative learning is based on constructivism, which is aimed at getting the students to take full responsibility for working together, constructing knowledge together, evolving together, and of course, improving together (Dooly, 2008). It also can be based on connectivism, which recognizes the impact of technology on society and ways of knowing. As per Siemens (2005) connectivism is "the integration of principles explored by chaos, network, and complexity and self-organization theories" in which learning in not entirely under the control of the individual; rather, it can reside outside of ourselves and occurs through interaction with various sources of knowledge and participation in different group activities and social networks. In this paper, we present different design strategies and innovative pedagogical approaches that foster collaborative learning through usage of a variety of technologies.

Context

The Master of Educational Technology (MET) is a fully online graduate-level program offered by the University of British Columbia that has attracted students from over 35 countries. The program is designed for educators from different levels and diverse contexts such as K–12 teachers, college and university educators, adult/industry educators, and course/instructional designers. In this paper, we present two MET courses as exemplars of collaborative learning and student engagement in case format. Both courses were developed in WordPress, a blogging tool supported by the university, and adopted a similar approach where participants are peers in a professional network and instructors act as fellow peers or facilitators of learning. The content is publicly available with user-restricted access to learning activities.

Case 1 – ETEC 522: Students as Contributors and Reviewers in a Highly Interactive Course

Ventures in Learning Technology is an online immersion in the global learning technologies marketplace with particular emphasis on emerging markets for learning technologies in public and commercial domains. This course is delivered in a case-study modality from a venture and market analysis perspective, where students examine real-world enterprises and markets while acting as venture creators or analysts. The course culminates with a *venture forum* featuring real or possible venture concepts that learners design and *pitch* to the class. This course is designed to operate as a professional network, a place where social networking techniques are applied to foster individual and collective professional advancement. Students are encouraged to participate in different group discussions and evaluate each other's work.

Rationale for Technology Integration

The design team, consisting of the instructor and the instructional designer, foster a scaffolding environment by utilizing different technologies such as Evaluate plugin and voting system. The authoring and reviewing of discussion posts is an important aspect of the course, where the participants are required to publish posts with original value that will have an impact on the community of learners. The intent of a review (reply to a post) is to add distinct value to existing content as a benefit for students and their peers. Reviews are not anonymous and build direct reputation value for their authors. Also, as in a threaded discussion, it is possible to read a review (reply to a review), which allows for a calibration of reviews. The rating of posts and recommending of reviews is another important aspect of the course, where the intent is to collectively identify the most worthwhile content. The rating of posts (Evaluate plugin) uses a five-star rating function (five stars being considered as essential and one star as outdated), and the recommending of reviews uses a one-way voting system (Thumbs-up). Ratings are anonymous, and students are encouraged to be wise and professional in their voting and follow the instructions carefully. Different guidelines are provided for learners on how to get engaged with these activities and how to use different technologies to foster collaborative learning.

Collaborative Strategies

Students participate in Opportunity Forecasts team presentations and contribute to discussion topics on emerging learning technologies presented as Open Educational Resources (OERs) by teams of peers. The intent of discussions is to enable an informal learning benefit for all participants, with collectively generated content. Students need to contribute in a timely manner to the group discussions and avoid posting their thoughts on one group's discussion topic when the next group is already fully underway, to maintain continuity for everyone. The instructor provides clear guidelines to establish effective collaborative learning, as small group work reinforces student interaction and fosters diversity (Bean, 2011). Students can also recommend exceptional contributions through a Thumbs-up voting function. To maintain concise value and allow students to stay on track with all the discussions, digital badges (BadgeOS plugin) are automatically awarded upon completion of a series of required steps

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(publish a post, comment on a post, rate an article, etc.). Students are notified by a pop-up message; they can also click on the badge image to view the list of tasks to achieve. Figure 1 shows students' responses to a discussion activity. The total number of one-way voting (Thumbs-up) is available.

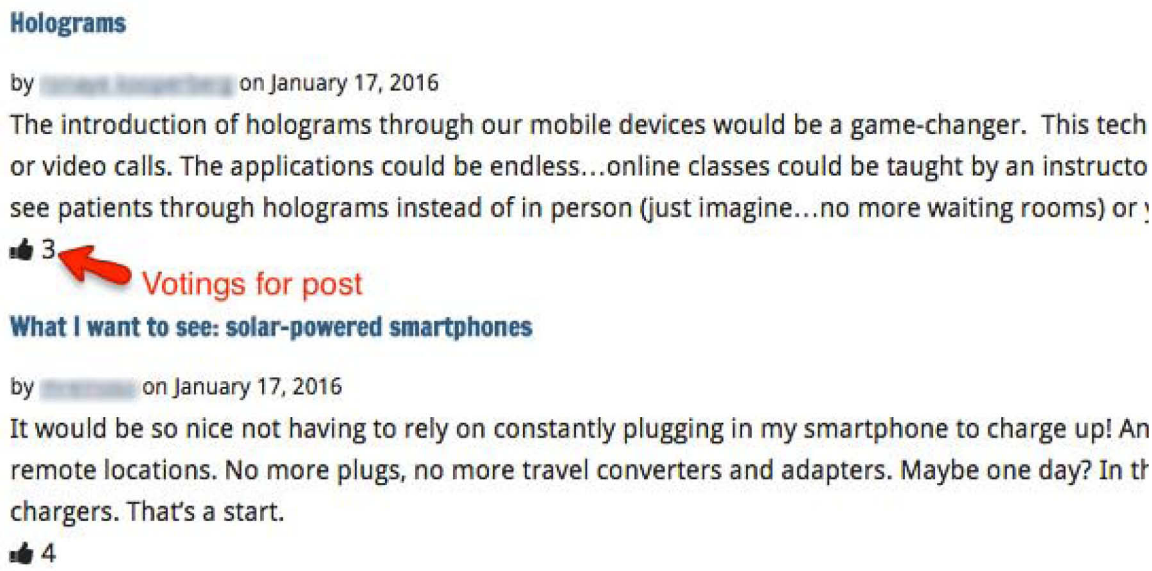

Figure 1. Voting system

High-Rated Posts are available on the sidebar, which displays the five high-rated posts (see Figure 2). The information is updated automatically.

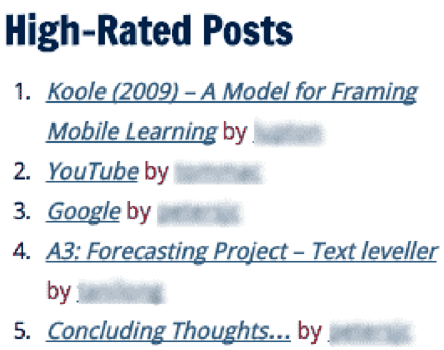

Figure 2. Top five high-rated posts

As per Dillenbourg (1999), the degree of interactivity among peers is not defined by the frequency of interactions but by the extent to which these interactions influence the peers' cognitive processes. In the examples above, learners construct their knowledge by connecting with others and reading postings, rating them, and commenting on them.

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Case 2 – ETEC 565M: Facilitating Student Collaboration through a Social Medium

Mobile Education is an evolving online course that is examining the impact of mobile technologies on knowledge systems. This course is an experiential immersion in the proven and emerging potentials of mobile technologies and open learning. It is designed to be mobile oriented with the use of a social medium (PulsePress) for short messaging, allowing more efficient communication among learners. Students become proficient with the theory and strategy of mobile education through collective critical analysis of existing technologies, applications, and trends in the global mobile culture specific to knowledge acquisition, generation, and dissemination. Collaborative learning occurs in the forms of collective feedback and curation utilizing different technologies and strategies such as PulsePress and BadgeOS™ plugins.

Rationale for Technology Integration

ETEC 565M is designed as a *professional network*, a place where social networking techniques are applied to foster individual and collective professional advancement. The experimental nature of this course necessitates the use of PulsePress, a plugin similar to Twitter, which allows short and immediate interactions and, combined with the Evaluate plugin, replaces the traditional comment experience. PulsePress enables better forms of collective feedback and curation along with the digital badge integration. Given the number of students in the course and the volume of discourse collectively generated, students need to focus on being deliberately concise and distinctly valuable. They can also participate in their group discussions from their mobile devices.

Students also need to collectively identify the most worthwhile contributions, by proceeding to the rating of posts (five-star rating) and recommending of reviews (Thumbs-up).

Digital badges (BadgeOS™) are used to illustrate the full depth and breadth of students' abilities and skills developed throughout the course by the completion of required steps. The instructor is able to track student overall activity in the course and verify that students earn a badge. Figure 3 gives an example of one of the digital badges, Peer Badge, within the course.

Figure 3. Peer badge

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Collaborative Strategies

Peer review and content curation are the two design strategies used in this course. Students participate in *Movable Feast* team presentations and contribute on special topics in mobile education produced and delivered by different groups. Their contributions to the discussion topics must be completed in a timely manner to maintain continuity and engagement. This continuity is also reinforced by digital badges (*Badge*OS™ plugin), which are awarded upon completion of required steps, such as the publishing and rating of posts in a particular discussion topic. The instructor can also track the completion of the different steps (log entries) and consult the list of students who earn a specific badge.

The following example shows a student post with the five-star rating function indicating the average score. The participants' reviews are available at the bottom of Figure 4, made using the one-way voting system (Thumbs-up).

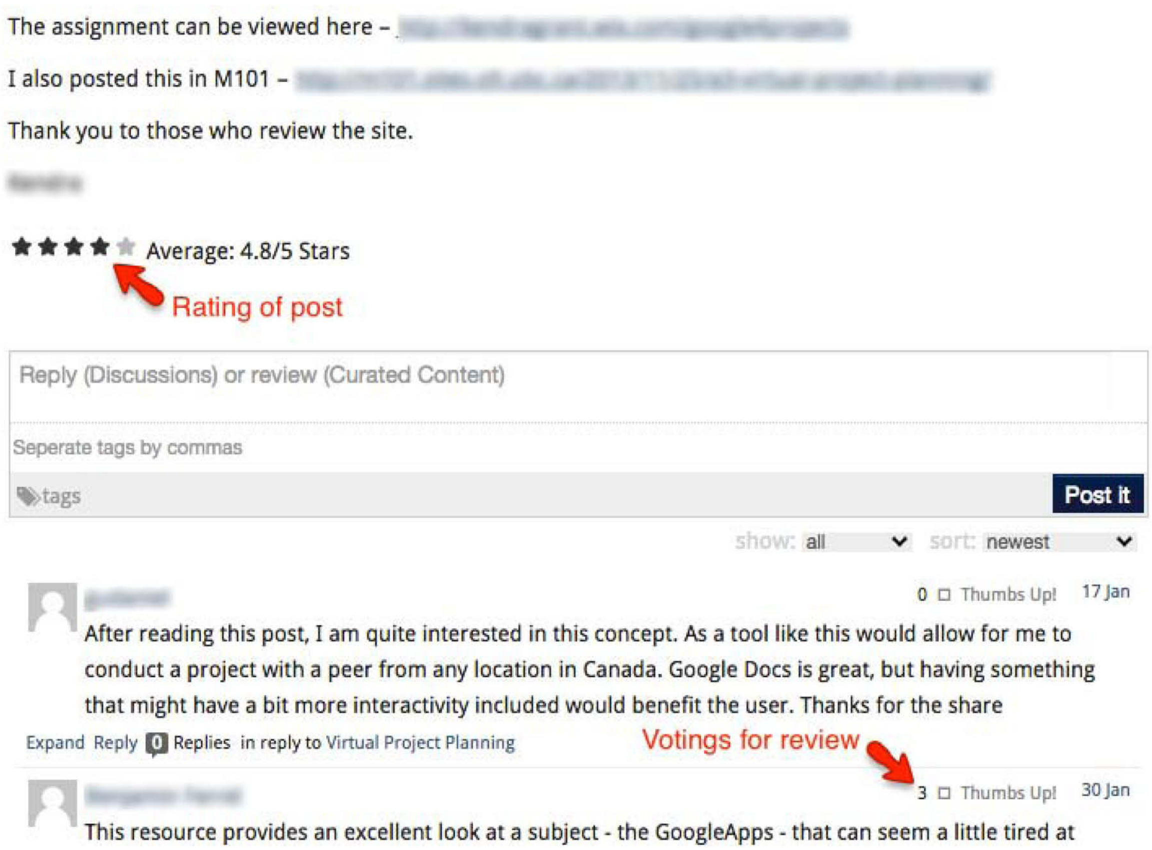

Figure 4. PulsePress rating and voting

Conclusion

With any new technology integration, a new set of instructions and guidelines need to be provided for learners. Students need to be aware of any new testing or technology integration, and an alternative plan should be in place in case the piloting does not go well. In our cases presented above the data for every course are collected and can be analyzed in different aspects. However, the data storage per course takes a lot of server space; this needs to be considered for future developments.

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Despite best efforts in course design and instruction, a group might have low participation by some group members and low quality outcomes in terms of the interchange and the final result. It is important to recognize that there are a number of factors that can contribute to a lack of participation and dysfunction in group activities in an online course. Group projects require that learners be present on a particular schedule and participate in their group discussions within specific timelines, reducing the flexibility and convenience factor in online study and possibly causing anxiety, particularly if the purpose of the group work is not clear and the group experience is not positive. Another factor can be the complexity of the technologies and strategies used; in our examples different guidelines and instructor presence overcome those challenges.

Finally, the dissatisfaction and reluctance that students express over mandatory participation in group projects often result from a sense of not having full control over the quality of the assignment and the subsequent grade assigned, particularly when someone in the group is less active than others. This may be a good reason for not placing emphasis on grading as much as helping students to learn the skills of collaboration. In our cases, the instructor used the badging system instead of grading to motivate the learners and engage them in their group activities. If the right environment is created, both high-performing and low-performing students are able to reflect on and articulate their opinions about their experiences and the outcomes of their learning. That being said, it is important to acknowledge the extra time and special skills required of instructors to ensure the effectiveness of group activities and new approaches. Research appears to confirm that small group collaboration needs careful design and management by the instructor (Swan, Shen, & Hiltz, 2006). A collaborative activity may not go smoothly right away, but it can be seen as a goal to strive for that evolves and improves constantly. Dooly (2008) emphasizes that students who learn most are those who give and receive elaborate explanations about what they are learning and how they are learning it. Some of the pedagogical benefits of collaborative learning in these two courses are co-creation of knowledge and content, reflection, development of critical thinking skills, and transformative learning (Palloff & Pratt, 2005).

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A BENCHMARKING STUDY OF K-MEANS AND SOM APPROACHES APPLIED TO A SET OF FEATURES OF MOOC PARTICIPANTS

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Abstract

MOOC format is characterized by the great diversity of enrolled people. This heterogeneity of participants represents a challenging opportunity in order to identify underlying relationships in the internal structure of features that make up participants' profiles. This paper has the aim of identifying and analyzing a feasible set of MOOC participants' profiles with the use of two unsupervised clustering techniques, K-Means as a partitional clustering algorithm and Kohonen's Self-Organizing Maps (SOMs), hereinafter SOM, as a representative technique of Artificial Neural Networks (ANNs).

The selected dataset comes from MOOCKnowledge project data collection, which provides the opportunity to work with real-world data from hundreds of people. The clustering approach is performed by running both algorithms with a subset of participants' features. The clustering evaluation is achieved with some indices, an intra-cluster measure and an overall quality criterion for K-Means, and two measures related to topological ordering for SOM.

The analysis of internal structure with the help of the matrix of prevalence levels shows that there are similarities between the two resulting clustering on the one hand and some pinpointed differences that cannot be evaluated in advance without the opinion of an expert familiarized with the specifications of the MOOC on the other.

The comparison of matrix of prevalence levels of participants' features for the resulting profiles of both K-Means and SOM clustering cannot be considered conclusive after a preliminary study of the results of the clustering, and for sure there is a long way in order to help designers and other policy-makers to provide a methodological guide on how to identify and select the appropriate clustering according to several quality criteria and therefore, to raise the likelihood of finding a clustering that best fits.

Introduction

This paper has the final purpose of dealing with a comparative study of two different clustering approaches (K-Means and SOM) on participants' selected features of a MOOC in the scope of the personal development. Clustering can be discovered as a useful exploratory technique for identifying and analyzing MOOC participants' profiles, a format characterized by the great diversity of enrolled people, which come from different personal and professional backgrounds, a very large range of knowledge levels, dissimilar motivations and goals, as well as many other heterogeneous issues that make more changing their clustering.

In the field of MOOC format, the understanding of participants' behaviour and the knowledge of participants' profiles are rather limited and just confined to a description of participants' features and their percentage of presence in the courses. Definitely, and according to Liyanagunawardena et al. (2013), the lack of information about MOOC participants for sure represents a challenge for researchers.

Clustering technique in this study is performed by running K-Means and SOM algorithms with a subset of variables collected from a survey with the aim of grouping the participants of a MOOC in a cohesive way. Participant's features include gender, date of birth, educational level, employment status, previous MOOC experience, goals setting and finally the role of interaction in the learning process from participants' perspective. Two aspects are addressed, firstly the clustering evaluation by applying quality criteria to the resulting clustering of K-Means (intra-cluster value and average Silhouette width) and SOM (estimated topographical accuracy and average distortion measure) and, secondly, its further interpretation in order to identify underlying relationships in the internal structure of features that make up participants' profiles, which may help designers and other policy-makers to have a deeper understanding of the diversity of participants' profiles.

The paper is structured as follows. Firstly it is briefly described Open Education movement and introduced MOOCKnowledge project. Next, K-Means and SOM techniques are proposed. Afterwards a description of KDD-based methodology is detailed. This is followed by evaluation and interpretation clustering. Finally, this paper presents the most relevant preliminary conclusions of the comparison of internal structure of both K-Means and SOM clustering and possible lines of future work are discussed.

Open Education movement

The Declaration of Paris on Open Educational Resources (OER) recommends promoting the knowledge and using of open and flexible education from a lifelong learning perspective (UNESCO, 2012), which for the Lisbon European Council represents a basic component of European social model in order to build a more inclusive, tolerant and democratic society (Commission of the European Communities, 2001). In the same way, OpenCourseWare (OCW) program initiative represents one step further and Massive Open Online Courses (MOOC) alternative provides an opportunity to access to Open Education scenario to a great number of people from any place in the world. The desire of learning without constraints leads to identify a diversity of profiles that considers people intentions, needs, motivations and goals, among others. All these features play an important role in the new educational trends and have the support of the European institutions (Commission of the European Communities, 2001), but unfortunately they have little prominence in research scope. MOOCKnowledge project, an initiative of the European Commission's Institute of Prospective Technological Studies (IPTS), aims to establish large-scale cross-provider data

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collection on European MOOCs to cover partially the participants' underrepresentation from a participant-centred perspective, where the diversity of the participants and the variety of profiles represent a relevant issue (Kalz et al., 2015).

Clustering techniques: K-Means and SOM algorithms

Clustering is an example of unsupervised learning that aims to find natural partitions into groups (Farias et al., 2008). This paper is focused on two clustering techniques, K-Means and its four methods (Lloyd, 1957; Forgy, 1965; MacQueen, 1967; Hartigan-Wong, 1979) as a partition-based clustering algorithm and Kohonen's Self-Organizing Maps (SOMs) as a representative technique of Artificial Neural Networks (ANNs). Clustering can be a useful exploratory technique for identifying and analyzing MOOC participants' profiles with the purpose of discovering underlying relationships in the internal structure of participants' features that could provide support for MOOC designers and other policy-makers.

K-Means takes as input parameters a set S of entities and an integer K (number of clusters), and outputs a partition of S into subsets $S_1,...,S_k$ according to the similarity of their attributes (Chen et al., 2002). The main points of interest for this paper are the four K-Means methods, the estimation of the number of clusters (K) (Jain et al., 1999) and the minimization of the total distance between the group's members and their centroids (intra-cluster distance).

SOM technique, developed by Teuvo Kohonen in 1982, is a type of Artificial Neural Network (ANN) model inspired by a kind of biological neural network (Hertz et al., 1991) and is performed to identify, classify and extract features of high-dimensional data (Deligiorgi et al., 2014). This network architecture considers on the one hand a neurons' learning network and on the other hand the training vectors (input layer) of dimension n. The elements of these two layers are fully connected and the training set is mapped into a two-dimensional lattice (Kohonen, 1989).

Methodology

This methodological proposal is based on Knowledge Discovery in Databases (KDD) system and is built up of a set of stages (Fayyad et al., 1996).

Within MOOCKnowledge project was implemented an online multilingual survey although for this paper it was only selected the one of a MOOC in the field of personal development that was offered by a Spanish higher education institution and provided by MiriadaX in the autumn of 2014. The number of enrolled population was about 10,000 and the number of fully filled out pre-questionnaires was 715. This is an opportunity for applying K-Means and SOM clustering algorithms with real-world data from hundreds, even thousands of people. This data sample was made up of the following participants' features:

- demographics (gender, age),

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- Human Development Index (HDI), a summary measure in key dimensions (life expectancy, education, income) of human development (Jahan, 2015) with four levels (very high, high, medium and low),
- educational level (Pre-primary education, Primary education or first stage of Basic education, Low secondary or second stage of basic education, (Upper) secondary education, Post-secondary non-tertiary education, First stage of tertiary education, Second stage of tertiary education),
- employment status (employed for wages, self-employed, out of work and looking for work, out for work but not currently looking for employment, student, military, retired, unable to work),
- previous experience in MOOC format,
- setting of participants' goals regarding their enrolment in a MOOC (establishment of standards for assignments, establishment of short- and long-term goals, maintenance of high standards in learning, management of temporal planification, confidence in the work quality assurance),
- importance of the three kinds of interaction (learner-learner, learner-instructor and learner-content) identified by Michael Moore (1989) from participants' perspective.

The interface used in this study is RStudio Version 0.99.491 licensed under the terms of version 3 of the GNU Affero General Public License. Furthermore, R 3.2.3 GUI 1.66 Mavericks build (7060), part of the Free Software Foundation's GNU Project, is the selected environment for performing this study.

As a reflection of real-world data, it was needed an additional effort in data cleaning process for dealing with extreme outliers. Most of the fields of a set of records were empty, they was finally rejected in order to perform more consistent data exploitation. This study had mixed type data (continuous and categorical) and, consequently, standardization stage was performed. The chosen technique was to replace categorical data with binary data and to apply the Z-score standardization method for continuous data. On that point, data sample was ready for a clustering analysis with 657 resulting records.

The number of iterations running K-Means for each method was 120 times and SOM was iteratively performed 480 times. In order to evaluate the quality of K-Means clustering, it was applied an intra-cluster measure and the average Silhouette width, respectively. The chosen K-Means clustering was the one with the minimum intra-cluster value (5553.208), which matched with Hartigan-Wong's method and with K = 4. The clustering candidate had a value close to zero (0.09) for average Silhouette width criterion, which revealed it could not be ensured that all participants were properly grouped (a value close to 0 in a range value between -1 and 1), although was the highest value of all the implementations. The estimated topographical accuracy and the average distortion measure, which should be minimized and maximized respectively, were the two selected quality measures to evaluate the resulting SOM

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clustering, with values of 38.136 and 0.98. Both indicators were referred to what degree the topology reflects the relationships in input data (sample data). These statistics evaluated clusters without any previous knowledge related to MOOC participants' features and as result it could be chosen the local (sub)-optimal clustering and afterwards extracted the meaningful information about MOOC participants.

Measure criteria of previous stage were focused on data themselves and evaluated clusters without prior knowledge of MOOC participants. This stage, clustering interpretation, was the process that made possible the extraction of previously unknown knowledge and useful information from a subset of variables from the MOOC pre-questionnaire.

Results and discussions

Due to the heterogeneity of MOOC participants' profiles, there was no prior knowledge in advance about their number within a specific MOOC. The application of unsupervised clustering techniques allowed the selection of the best of all resulting clusters for both algorithms, which were based on the established quality criteria. These set of clusters show to what extent every participants' feature contributes in the internal structures for the identified MOOC participants' profiles by running K-Means with the method Hartigang-Wong and SOM.

The segmentation of participants into the different profiles evinced significant similarities between K-Means and SOM clustering, as is shown in Table 1. However, it would be necessary a deeper analysis in order to verify this behaviour.

Table 1: Number of participants per profile

Number of participants	Profile 1	Profile 2	Profile 3	Profile 4
K-Means	105	277	48	227
SOM	42	278	120	217

Demographic information (age and gender) and MOOC experience of participants are shown in Table 2 and Table 3, respectively. The ages of participants varied over a very fairly similar range of weights for the eight clusters. It was highlighted that the maximum age was located in K-Means, while the minimum in SOM. The weights of gender belong to women and it was noteworthy their greater presence except in S_Profile4, where the majority were men. Finally, regarding the MOOC experience of participants, only a profile, K_Profile3, had an inexplicable weight. It seemed that its participants had taken 24 MOOCs on average.

Table 2: Demographics and MOOC experience of participants for K-Means clustering

Features	K_Profile1	K_Profile2	K_Profile3	K_Profile4
Age	38	49	40	28
Gender (Female)	0,638	0,635	0,604	0,722
MOOC experience	5	5	24	8

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Table 3: Demographics and MOOC experience of participants for SOM clustering

Features	S_Profile1	S_Profile2	S_Profile3	S_Profile4
Age	37	39	42	22
Gender (Female)	0,738	0,669	0,658	0,387
MOOC experience	8	5	6	6

With the purpose of making a preliminary analysis, each of features' weights that contributed to shape those eight profiles set above (Table 1) were mapped to VERY HIGH, HIGH, MEDIUM and LOW values. These new tables, called matrix of prevalence levels, are shown in Table 4, Table 6, Table 8, Table 10, Table 12 for K-Means and Table 5, Table 7, Table 9, Table 11, Table 13 for SOM.

Human Development Index (HDI) had a similar weight for both techniques, although it seemed that in SOM could prevail with the weight very high. In any case, one reason could be that these weights reflect that most participants came from countries mapped with a very high- and high-HDI index. (Table 4 and Table 5)

Table 4: Matrix of prevalence levels of participants' HDI for K-Means

Feature	K_Profile1	K_Profile2	K_Profile3	K_Profile4
HDI	HIGH	VERY HIGH	HIGH	HIGH
	MEDIUM	LOW	MEDIUM	MEDIUM
	LOW	LOW	LOW	LOW

Table 5: Matrix of prevalence levels of participants' HDI for SOM

Feature	S_Profile1	S_Profile2	S_Profile3	S_Profile4
HDI	VERY HIGH	VERY HIGH	VERY HIGH	HIGH
	LOW	MEDIUM	LOW	LOW
	LOW	LOW	LOW	LOW

Among the elements for the feature educational level of a participant, the only one with a predominant weight was *Second stage of tertiary education* for both clustering. This variable had a high or very high prevalence weight for all profiles except for one on SOM clustering. (Table 6 and Table 7)

Table 6: Matrix of prevalence levels of participants' educational level for K-Means

Feature		K_Profile1	K_Profile2	K_Profile3	K_Profile4
Educational Level	Pre-primary education	LOW	LOW	LOW	LOW
	Primary education or first stage of basic education	LOW	LOW	LOW	LOW
	Lower secondary or second stage of basic education	LOW	LOW	LOW	LOW
	(Upper) secondary education	LOW	LOW	LOW	LOW
	Post-secondary non-tertiary education	LOW	LOW	LOW	LOW
	First stage of tertiary education	LOW	LOW	LOW	LOW
	Second stage of tertiary education	HIGH	HIGH	HIGH	HIGH

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Table 7: Matrix of prevalence levels of participants' educational level for SOM

Feature		S_Profile1	S_Profile2	S_Profile3	S_Profile 4
Educational level	Pre-primary education	LOW	LOW	LOW	LOW
	Primary education or first stage of basic education	LOW	LOW	LOW	LOW
	Lower secondary or second stage of basic education	LOW	LOW	LOW	LOW
	(Upper) secondary education	LOW	LOW	LOW	LOW
	Post-secondary non-tertiary education	LOW	LOW	LOW	LOW
	First stage of tertiary education	MEDIUM	LOW	LOW	LOW
	Second stage of tertiary education	VERY HIGH	VERY HIGH	VERY HIGH	MEDIUM

The elements student and employed for wages had high prevalence on K_Profile4 and K_Profile2 respectively. It stood out that it could characterize young students on K_Profile4 a high student's weight combined with the fact that the average age was 28 years, although it would be needed further analysis in order to verify this hypothesis. K_Profile2 showed the same circumstance with the element employed for wages and the average age 49 years that could characterize middle age employed people. The weight of element employed for wages on SOM was not as prevalent as on K-Means, although had a certain prevalence on every profile. (Table 8 and Table 9)

Table 8: Matrix of prevalence levels of participants' employment status for K-Means

Feature		K_Profile1	K_Profile2	K_Profile3	K_Profile4
Employment status	Homemaker	LOW	LOW	LOW	LOW
	Student	LOW	LOW	LOW	HIGH
	Employed for wages	MEDIUM	HIGH	MEDIUM	LOW
	Out of work and looping for work	MEDIUM	MEDIUM	LOW	LOW
	Out of work but not currently looking for wages	LOW	LOW	LOW	LOW
	Retired	LOW	LOW	LOW	LOW
	Self-employed	LOW	LOW	LOW	LOW
	Unable to work	LOW	LOW	LOW	LOW

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Table 9: Matrix of prevalence levels of participants' employment status for SOM

Feature		S_Profile 1	S_Profile 2	S_Profile 3	S_Profile 4
Employment status	Homemaker	LOW	LOW	LOW	LOW
	Student	MEDIUM	MEDIUM	MEDIUM	LOW
	Employed for wages	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Out of work and looping for work	MEDIUM	MEDIUM	MEDIUM	LOW
	Out of work but not currently looking for wages	LOW	LOW	LOW	LOW
	Retired	LOW	LOW	LOW	LOW
	Self-employed	LOW	LOW	LOW	LOW
	Unable to work	LOW	LOW	LOW	LOW

One of the most interesting features for this study was the setting of participant's goals because of its specific distribution of the weights on every cluster. K-Means preserved the same prevalence in each of the profiles, although K-Profile1 attracted the attention with its very high weight to all and each of the five elements. SOM had a quasi-identical circumstance in terms of profiles' behaviour, although participants that belonged to S_Profile1 gave a high prevalence to the element participant's confidence in the quality assurance of their work. Therefore, this feature should be analyzed in a more detailed way. (Table 10 and Table 11)

Table 10: Matrix of prevalence levels of participants' goals for K-Means

Feature		K_Profile1	K_Profile2	K_Profile3	K_Profile4
Goals setting.	Standards establishment	VERY HIGH	MEDIUM	MEDIUM	MEDIUM
	Short- and long-term goals establishment	VERY HIGH	MEDIUM	MEDIUM	MEDIUM
	High standards maintenance	VERY HIGH	MEDIUM	MEDIUM	MEDIUM
	Temporal planification management	VERY HIGH	MEDIUM	MEDIUM	MEDIUM
	Confidence in work quality assurance	VERY HIGH	MEDIUM	MEDIUM	MEDIUM

Table 11: Matrix of prevalence levels of participants' goals for SOM

Feature		S_Profile 1	S_Profile 2	S_Profile 3	S_Profile 4
Goals setting.	Standards establishment	MEDIUM	MEDIUM	MEDIUM	LOW
	Short- and long-term goals establishment	MEDIUM	MEDIUM	MEDIUM	LOW
	High standards maintenance	MEDIUM	MEDIUM	MEDIUM	LOW
	Temporal planification management	MEDIUM	MEDIUM	MEDIUM	LOW
	Confidence in work quality assurance	HIGH	MEDIUM	MEDIUM	LOW

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Focused on interaction feature, on K-Means clustering the range of weights took values from very high to medium. Learner-Content interaction was the element with a very high prevalence on K_Profile1, Learner-Learner interaction was the least representative interaction for the eight clusters and, finally, Learner-Teacher interaction did not show such a regular behaviour as the other two characteristics described above. On SOM the range of weights was from high to low and Learner-Content interaction was depicted with a greater weights. Undoubtedly, the three interactions played their role in each and every one of the profiles, even on those where the prevalence was low, and also a deeper analysis should be accomplished. (Table 12 and Table 13)

Table 12: Matrix of prevalence levels of types of interactions of participants for K-Means

Feature		K_Profile1	K_Profile2	K_Profile3	K_Profile4
Interactions	Learner-Learner	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Learner-Content	VERY HIGH	HIGH	HIGH	MEDIUM
	Learner-Teacher	HIGH	MEDIUM	MEDIUM	MEDIUM

Table 13: Matrix of prevalence levels of types of interactions of participants for SOM

Feature		S_Profile 1	S_Profile 2	S_Profile 3	S_Profile 4
Interactions	Learner-Learner	MEDIUM	MEDIUM	MEDIUM	LOW
	Learner-Content	HIGH	HIGH	HIGH	MEDIUM
	Learner-Teacher	HIGH	MEDIUM	HIGH	LOW

In conclusion, the results brings to light that it is not possible to determine the best clustering without additional analysis.

Conclusions

In this study it was chosen two types of algorithms from two different approaches, a partitional clustering algorithm and an artificial neural network. The comparison of K-Means and SOM was performed with the aim of finding out which of them fitted better. These clustering techniques were applied under some specific conditions to a better understanding of MOOC participants' subset of features and might represent a way of discovering the intrinsic structures within the data sample and, consequently, designers and other policy-makers could also have a deeper understanding of the diversity of participants' profiles. It should be emphasized that the role played by experts in MOOC format has a critical subjective component and their relevance is even greater because clustering result is largely influenced by data sample, the selected variables and the used clustering algorithm.

A more realistic understanding of people profiles is a step forward for many disciplines that call for a more in-depth knowledge of their customers and Open Education is no exception. Therefore, future work in the short to medium term involves a deeper research of clustering techniques, especially both evaluation and interpretation of clustering, with the involvement of the whole data collection of MOOCKnowledge project.

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AN EXPERIMENT OF SOCIAL-GAMIFICATION IN MASSIVE OPEN ONLINE COURSES: THE ECO IMOOC

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Introduction

Massive Open Online Courses (MOOCs) represent a disruptive new trend that has brought scalability and openness to non-formal education. In fact, MOOCs have the potential to widen participation in higher education, thus contributing to social inclusion, the dissemination of innovation and the internationalization of higher education institutions. These courses have three main properties: they are (a) scalable, because they are intended for several thousand participants; they are (b) open, since enrolment is free of charge and there are no admission barriers; and they are (c) online because participants use the Internet to access content, resources and assignments, as well as to interact with other participants (Saltzman, 2014; McAuley, et al., 2010).

However, designing and running a MOOC also requires facing several logistical, technological, pedagogical and financial issues (Jordan, 2013). For instance, participants do not invest money in enrolling in a course, so it is very easy for them to drop it at any time without facing the consequences typically experienced in traditional courses (North, Richardson, & North, 2014). Participants' expectations and goals regarding their learning output in MOOCs are substantially different from conventional formal education. This also implies that completion rate is extremely low (between 5% and 20%) (Daradoumis et al., 2013; Malan, 2013; Jordan, 2013) when compared to traditional formats, which makes it challenging to determine whether MOOCs are successful (Daradoumis et al., 2013; Sahami et al., 2013).

On the other hand, over time education researchers have conducted many theoretical and empirical studies on the videogames subject. These studies have disclosed many potential advantages of videogames in education like immediate feedback, information on demand, productive learning, motivating cycles of expertise, self-regulated learning or team collaboration (Gee, 2003; Rosas et al., 2003); but also some issues related to educational content, learning transfer, learning assessment, teacher implication and technological infrastructure (Facer, 2003; Squire, 2002; 2003).

Due to the aforementioned issues, some researchers do not use only videogames to educate; instead they seek to export the positive aspects of videogames to non-gaming educational contexts. This concept is commonly called *gamification*. Some researchers generically defined it as “the use of game design elements and game mechanics in non-game contexts” (Domínguez et al., 2013; Deterding et al., 2011), although this broad definition has been further redefined to reflect the most common objective of gamification: increase user experience, facilitate engagement with a system and motivate actions (Kapp, 2012). Attending to these facts, it could be more accurately defined as incorporating game elements into a non-gaming software application to increase user experience, engagement and motivation.

Gamification seems thus to be a natural next step towards the development of engaging and collaborative learning experiences, making it perfect for MOOCs, where learning experiences are of this type. Furthermore, since motivation is one of the advantages provided by gamification, it would be desirable to apply it to MOOCs in order to increase the motivation of students and to decrease the dropout rate. Therefore, this paper presents the results of an experiment using gamification in a real MOOC. This has been developed by an international team composed by researchers from Universidade Aberta (Portugal) and University of Alcala (Spain). The course selected for the experiment is a sMOOC developed by Universidade Aberta (Portugal) in the framework of the ECO project partnership, which draws their pedagogical approach from the iMOOC pedagogical model created by Teixeira and Mota (2013).

The paper is structured as follows: next section shows the experimental design of this research. Results section shows the results obtained in the two iterations of the course carried out in the experiment. Finally, the Conclusions section introduces the conclusions obtained in the experiment.

Experimental design

Based on the iMOOC methodology (Teixeira & Mota, 2013) and on its use by the ECO project, which leads to the development of a new approach called ECO sMOOC, an ECO iMOOC environment was designed, serving as a test bed for a number of pilot courses such as *Digital skills for teachers* (Figure 1). This environment uses the Elgg framework for providing social networking and community building functionality in the course (e.g. friends, stream, blogging, microblogging, etc.).

A first version of the MOOC *Digital skills for teachers* was carried out from 24th October 2014 until 10th January 2015. This was considered as the first iteration of the course with 427 participants in total. The environment of this first iteration was created using Moodle and the Elgg framework. A second iteration of the course was carried out from 27th April 2015 until 7th June 2015 with 591 participants in total. This second iteration included the components of the first one as well as gamification components that were added. Some of these gamification components have already been tested in other scenarios with positive results (De-Marcos et al., 2014; 2016). The details of the elements used in the iterations are explained in the next sections.

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Instrument of the first iteration: Moodle + Elgg

The first iteration of the course was built using the Elgg framework and Moodle. Moodle was used for delivering learning contents and the tasks for completing the course. Elgg was used for including the functionality of social networks: followers, short messages (tweets), blogging, etc.

Figure 6. ECO iMOOC Platform in the first iteration of the MOOC

Instrument of the second iteration: Moodle + Elgg + Gamification

The MOOC in this second iteration was built based on the components of the first iteration, but in this case we developed and included a plugin with some extra functionality about gamification. We added to the platform some game elements, such as achievements and the leaderboard. The aim was to improve the use of the platform and to increase the number of students that completed the course.

Achievements

A list of achievements was developed with the aim of establishing some challenges or "missions" that students had to complete to get points. The objective of using the achievements was to increase the participation of the students in the platform (Figure 2).

The list of achievements implemented in this experiment is showed in the Table 1.

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Table 1: List of achievements created for the MOOC

	iPerfil	Given to all who complete their profile during the bootcamp module.
	iPic	Given to all who upload their picture during the bootcamp module.
	iBlog	Given to all who post at least 1 entry in their blog during the bootcamp module.
	iPotencial	Given to all who complete iPerfil, iPic and iBlog achievements during the bootcamp module.
	iComentador	Given to all who post at least 15 entries in their blog.
	iColaborador	Given to all who post 15 entries in the bookmarks.
	iTweeter	Given to all who post 50 entries in the short messages stream – curtas.
	iFilósofo	Given to all who post at least 25 comments to other participant's posts.
	iSociável	Given to all who follow at least 25 other participants.
	iPopular	Given to all who are followed by at least 25 other participants.
	iEstrela	Given to all who receive at least 25 likes by other participants in one of his/her post.
	iReferência	Given to all who receive at least 5 replies by other participants in one of his/her post.
	iFator	Given to all who obtain the previous badges.

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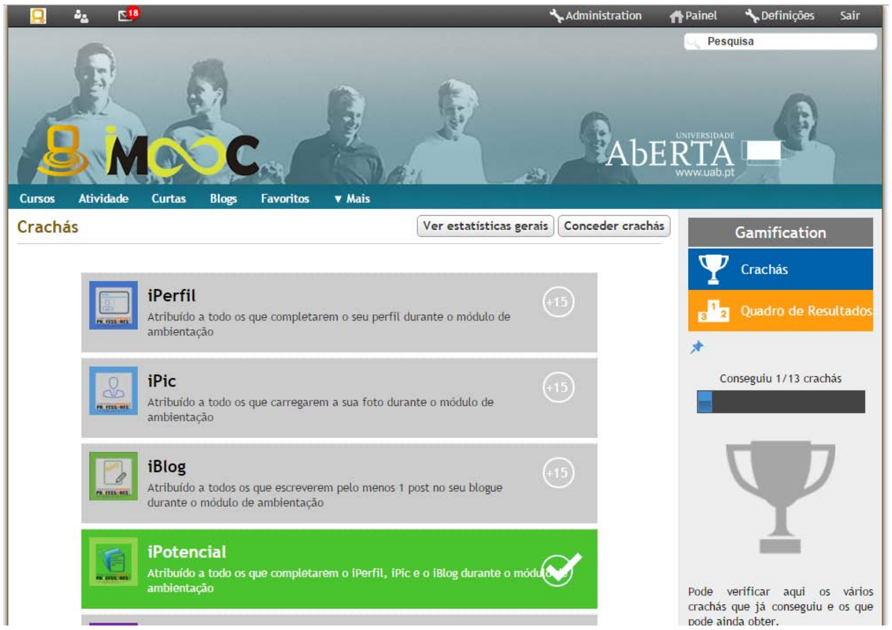

Figure 7. ECO iMOOC Platform with the achievements implemented

Leaderboard

A leaderboard was created (Figure 3) with the aim of showing the status of each student in the course and for encouraging the competition between students. Four different metrics were created to be showed in the ranking: (a) number of points obtained completing the achievements, (b) number of friends (follows) with other participants, (c) number of comments written in the platform and (d) number of short messages (tweets) in the platform.

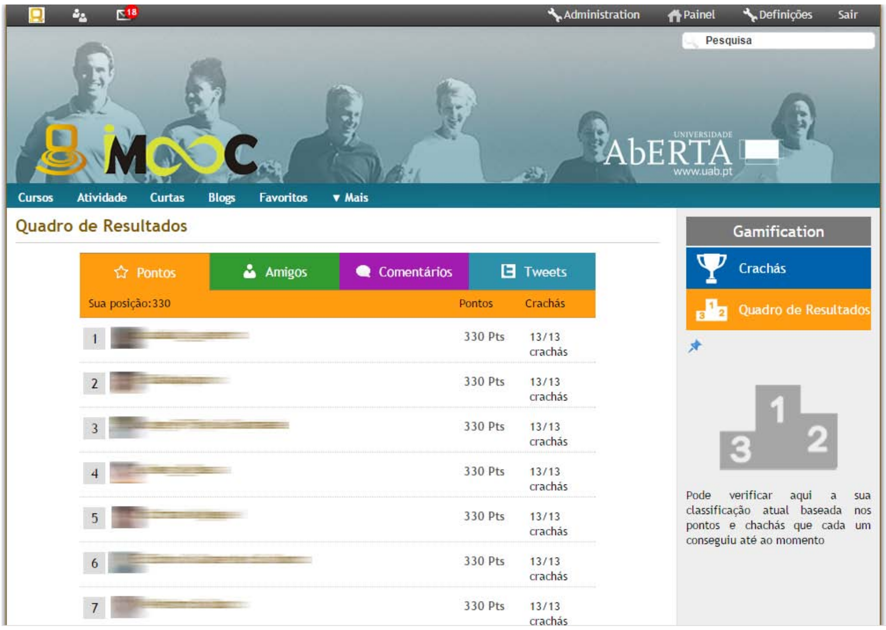

Figure 8. Leaderboard implemented in the ECO iMOOC Platform

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Results

This section shows the results obtained in the two iterations of the course. The first iteration is considered as *social group* (it includes social network mechanisms but no gamification) and the second iteration is considered as *social-gamified group* (it includes both social network mechanisms and gamification techniques).

Table 2 shows the results of these iterations. 3.51% of the students completed the course in the first iteration and 5.07% of the students completed the course in the second iteration. Therefore it can be observed that the number of students who passed the course was higher in the *social-gamified group*. Although this fact is positive, and obviously the results in the second iteration are better than in the first one, it has to be further improved because it is between the normal values considered in this kind of courses.

Table 2: Results of the social and social-gamified groups

	Social Group	Social-Gamified Group
# Total participants	427	591
# Participants passed the course	15	30
% Participants passed the course	3.51%	5.07%
# Participants asked formal evaluation (official certification)	3	0
% Participants asked formal evaluation (official certification)	0.70%	0%

Results of participation in the platform are shown in Table 3. It can be observed that, in all cases, the participation in the platform (blogs, Tweets, messages, etc.) is higher in the social-gamified group than in the social group. In general terms, it is important to highlight that the mean of total interactions in the social group is 117.0281, while in the social-gamified group the mean is 486.82 interactions. This means that the participants interacted more than four times more in the second iteration than in the first iteration.

Table 3: Results of participation in the social and social-gamified groups

	Social-group			Social-gamified group		
N	427			591		
	Total	Mean	Std. Dev.	Total	Mean	Std. Dev.
Blogs	292	0.68	2.41	1126	1.90	5.03
Tweets	524	1.22	6.25	2591	4.38	15.88
Likes	405	0.94	4.41	4134	6.99	33.14
Messages	1468	3.43	21.73	16805	28.43	164.32
Comments	478	1.11	4.92	1829	3.09	11.39
Followers	628	1.47	2.03	2964	5.01	9.85
Following	292	0.68	3.03	2849	4.82	15.54
Login	2645	6.19	15.81	5559	9.40	19.73
Total interactions	49971	117.02	409.04	287712	486.82	1851.20

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Conclusions

Two iterations of the *Digital skills for teachers* course were carried out. The first iteration was done using social network techniques based on the use of Elgg platform. The second one was performed using also social network techniques as well as some gamification mechanisms.

The results obtained in the second iteration are positive (regarding the percentage of participants who passed the course) with respect to the first iteration but the dropout rates are still low and they considered as "normal". Furthermore, the participation in the platform was higher in the second iteration with respect to the first one. Therefore we can conclude that the use of gamification techniques promote the use and participation of the social platform. It is also important to highlight that there is a need to continue researching in this field including more gamification techniques to reduce the dropout rate.

As future work we are planning to include Open Badges mechanisms (Mozilla Open Badges: http://openbadges.org), because this kind of reward can be kept after the course finishes, and this could be a good motivation for the participants in the MOOC. The possibility of integrating mobile devices in the courses will also be studied, as done in previous research (Garcia-Cabot et al., 2015).

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OPENNESS, MULTICULTURALISM, ATTITUDES AND EXPERIENCE IN ONLINE COLLABORATIVE LEARNING

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Introduction

Since 2010 a national ICT program has been operating in Israel known as *Adapting the education system to the 21st century*, that encompasses hundreds of elementary and junior high schools. Its main goals are (a) assimilating pedagogic innovation; and (b) imparting 21st century skills to all students. The program focuses on applying the output in schools from both the organizational and pedagogical aspects, one of which is communications and cooperation (Ministry of Education, 2015), which affords one of the changes in 21st century learning (Resta & Carroll, 2010). The teachers are expected to teach in a constructivist collaborative manner in an ICT environment in which the students are active and involved in the learning process. According to this approach, the new knowledge is constructed by the student through shared discussion amongst peers in the learning, social, and cultural context. The technological abilities of gathering, managing, creating, and sharing information enable realizing the many opportunities for innovative learning (Mikropoulos & Natsis, 2011; Solvie & Kloek, 2007). In every school a teacher was appointed as the ICT coordinator, whose role was to help introduce the technological change to school and to instruct the teachers in the successful application of the program's output. The teacher was chosen for having considerable and successful experience in the field and having technological-pedagogical-content TPACK knowledge (Ministry of Education, 2015), that characterized the teacher's ability to intelligently integrate technology in his teaching (Magen-Nagar & Avidov-Ungar, 2014).

Collaboration is one of the accepted methods of distance learning that developed with the spread of online learning in the education system (Harasim, 2012). This learning is based on the usual collaborative learning that includes five interrelated components: (a) Positive mutual dependency; (b) Personal accountability; (c) Fostering interaction; (d) Social skills; (e) Group process (Johnson & Johnson, 1999). When these components are executed well in the teaching process, the academic achievements, the involvement, the responsibility and the inner motivation of the learners improve (Hanze & Berger, 2007). Collaboration is similar to face-to face collaborative learning, but the meetings of group members are conducted through the internet in a synchronized or non-synchronized manner.

In the framework of the national ICT program some 30 diverse ICT collaborative programs exist at national and district levels serving the schools. An example of this is the Twinning Schools Project, Tec4Schools and Schools Online. The current study was conducted in the framework of the national ICT program, which aimed to examine the variables that predict integrating Online Collaborative Learning (OCL) in lessons amongst ICT coordinators who participate in such programs compared to ICT coordinators who do not participate. The variables are attitudes towards their students' openness to multiculturalism, attitudes regarding the advantages and the disadvantages of OCL, challenging experiences in OCL, as well as teaching seniority.

The research hypotheses

1. The more the ICT coordinators express more positive attitudes towards openness amongst their students to multiculturalism, so the attitudes towards the advantages of OCL will be stronger, and relative to the disadvantages will be weaker, the challenging experiences of OCL will be weaker, and the frequency of OCL will be greater. The intensity will be more significant amongst coordinators participating in the OCL program.
2. The more the ICT coordinators express strong attitudes towards the advantages and weaknesses regarding the disadvantages of OCL, so the challenging experiences therein will be lesser and the frequency of integrating OCL will be greater. The intensity will be more significant amongst coordinators participating in OCL program.
3. The more ICT coordinators enjoy weaker challenging OCL experiences in field, so the frequency of integrating such OCL will be greater. The intensity will be more significant amongst coordinators participating in OCL program.
4. The greater the teaching seniority of ICT coordinators, so the challenging experiences in OCL will be weaker and the frequency of integrating OCL will be greater. The intensity will be more significant amongst coordinators participating in OCL program.

Methodology

The participants

ICT school coordinators who participated in the national ICT program numbered 315. About half the coordinators participated in the OCL program (44%) and about half did not participate (56%). Most of them taught in elementary schools (70.6%); about half held that position for up to three years (52.2%) and the rest for longer (47.8%). Similarly, about half of the coordinators had a masters degree (52.2%), others had a bachelors degree (42.1%), and 0.9 % held a doctorate. Most had 11 years or more of teaching seniority (66.5%) and the rest had less (33.5%).

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The research tools

The research hypotheses were examined using a self-reporting questionnaire that was developed for this study and was based on questionnaires Narvaez and Hill (2009) and So and Brush (2008). It included 38 items divided into five indices:

1. Attitudes towards the students' openness to multiculturalism (10 items) (M = 3.17, SD = 0.66).
2. Attitudes towards the advantages of OCL (8 items) (M = 3.91, SD = 0.70).
3. Attitudes towards the disadvantages of OCL (8 items) (M = 2.51, SD = 0.73).
4. Challenging experiences in OCL (1 item) (M = 2.86, SD = 0.61).
5. The frequency of integrating OCL (1 item) (M = 2.92, SD = 1.14).

The five-rank scale ranged from 1 – *not at all*, to 4 – *greatly*. Furthermore, background data such as age, education, teaching seniority and coordination were gathered.

The research process

In the middle of the semester of 2016, when schools follow the annual ICT curriculum, the ICT coordinators were asked to complete the online questionnaire for self-reporting. Anonymity and confidentiality were assured by completing the questionnaire without identifying details.

Results

In order to examine the variables that predict the integration of OCL during the lessons amongst ICT coordinators participating in the collaborative ICT programs compared to ICT coordinators who do not participate, a path analysis was conducted using the statistical AMOS 22.0 software (Analysis of Moment Structures) structural equation modelling (SEM) (Arbuckle, 2013). This analysis is a multi-variable data analysis in a graphic environment, used when testing a complex model that includes a variety of variables or diverse dependency connections between the variables (Byrne, 2009). The first stage in SEM is evaluating the measurement model. The results of this model show that the value of χ is (df = 6) which is statistically not significant (p = .140). The RMSEA index was lower than .05 (.044); the NFI and the CFI indices were very high, approaching 1 (.973 and .989 respectively). These findings testify to a very good model, compatible with the research data.

The second stage involved evaluating the structural model that classifies the inter-variable impacts. Figure 1 presents the path analysis of the ICT coordinators participating in the OCL program, and Figure 2 presents that of the non-participating ICT coordinators. Each figure presents the standardized coefficients of influence (β), and the percentage of explained variance (R).

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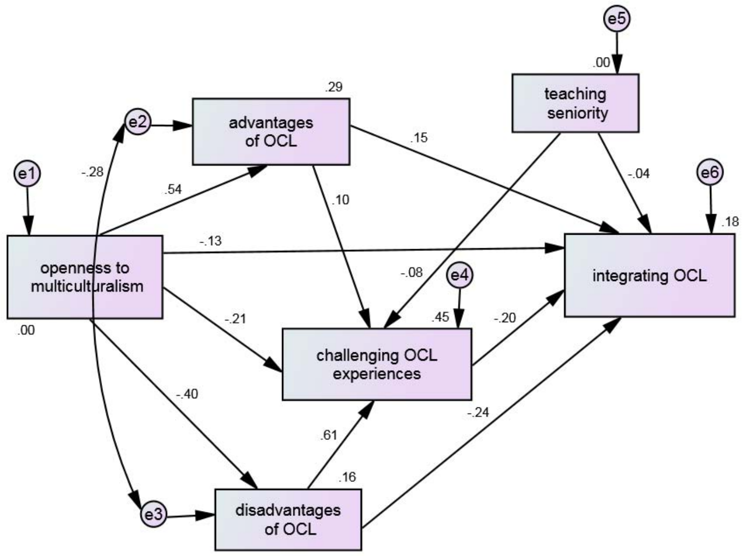

Figure 1. Analysis of the paths for ICT coordinators in the OCL program

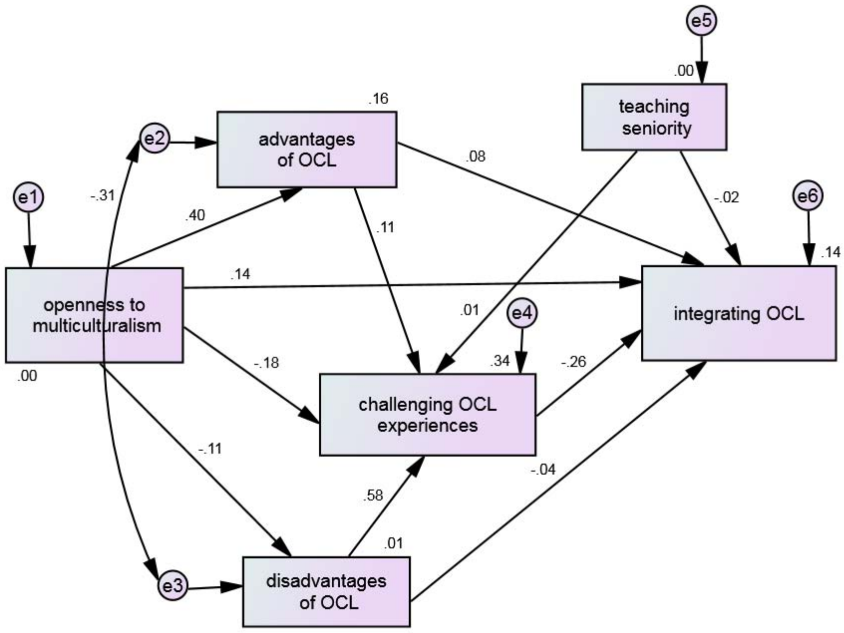

Figure 2. Analysis of the paths for ICT coordinators not in the OCL programs

Examination of the structural model and confirmation of the research hypotheses

Figures 1 and 2 show that different images were obtained in the percentage of explained variance of the endogenous variables for each group, wherein the variables are endogenous in the model for ICT coordinators participating in that program. Attitudes towards the advantages and the disadvantages of OCL and the challenging experiences in such learning are explained at a higher level that in the model for the ICT coordinators who did not participate therein. However, integrating OCL is explained to a similar, relatively lesser, extent by the five

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research variables amongst the ICT coordinators in that program and amongst the non-participatory ICT coordinators (14% and 18% respectively).

Examination of the first research variable shows that amongst ICT coordinators participating in the OCL program regarding attitudes towards their student's openness to multiculturalism, there is a significant strong impact on the attitudes towards the advantages and the disadvantages of OCL ($\beta = .54$, $\beta = -.40$, $p < .001$ respectively), on the challenging experience in low-intensity OCL ($\beta = -.21$, $p < .01$), but there is no significant influence on the frequency of integrating OCL ($\beta = -.13$, $p > .05$). Amongst ICT coordinators not participating in the OCL for attitudes regarding their students' openness to multiculturalism, there is a significant influence of high, positive intensity on the attitudes regarding the advantages of OCL ($\beta = .40$, $p < .001$) and on the challenging experience therein the influence is significant at lesser and negative intensity ($\beta = -.18$, $p < .01$). However, attitudes towards their student's openness to multiculturalism has no significant impact on the disadvantages $\beta = -.11$, $p > .05$) and on the frequency of integrating OCL ($\beta = -.14$, $p > .05$). The hypothesis was largely confirmed by ICT coordinators in the OCL program.

Examination of the second research hypothesis indicates that amongst IT coordinators participating in the online collaborative program on attitudes regarding the advantages of such learning lacks significant influence on the challenging experiences in online collaborative learning ($\beta = .10$, $p > .05$), and there is no significant impact on the frequency of integrating online collaborative learning ($\beta = -.13$, $p > .05$). However, attitudes towards the disadvantages of online collaborative learning have a significant impact of a strong, positive intensity ($\beta = .61$, $p < .001$) and of a low, negative intensity on the frequency of integrating such learning ($\beta = -.24$, $p < .01$).

Amongst ICT non-participating coordinators, regarding attitudes towards the advantages of OCL, there is no significant impact on the challenging experiences therein ($\beta = .10$, $p > .05$), or on the frequency of integrating OCL ($\beta = .08$, $p > .05$). However, attitudes towards the disadvantages of OCL have a significant strong, positive impact ($\beta = .58$, $p < .001$), but a significant influence on the frequency of integrating OCL ($\beta = -.04$, $p > .05$). The hypothesis was partially confirmed for the two groups.

Examination of the third research hypothesis indicates that amongst ICT coordinators participating in the OCL program for challenging experiences in such earning have a significant impact of low, negative intensity on the frequency of integrating OCL ($\beta = -.20$, $p < .05$).

Amongst ICT coordinators not participating in the OCL program for challenging experiences therein, there is a significant impact of moderate and negative intensity on the frequency of integrating such learning ($\beta = -.26$, $p < .01$ respectively. The hypothesis was confirmed.

Examination of the fourth research hypothesis can be seen within the two groups wherein teaching seniority has no influence on integrating OCL ($\beta = -.02$, $\beta = -.04$, $p > .05$ respectively). The hypothesis was not confirmed.

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Discussion and conclusions

The research findings show that the attitudes of ICT coordinators towards their students' openness to multiculturalism is of critical importance to integrating OCL in the lessons, wherein understanding the value of such learning and dealing with challenges when experiencing OCL are involved. Amongst ICT coordinators participating in this program, the variables involved indicate a significant process, thus the more positive attitudes they manifest towards their students' openness to multiculturalism, the lower are the attitudes towards the disadvantages of OCL, the weaker are the challenging experiences of OCL, and the greater is the frequency of its integration in learning. A most important factor found in the research is the attitudes towards the disadvantages of such learning that express a waste of teaching and learning time, creating tension between children and leading to disciplinary problems, difficulties achieving success by the student who is dependent on the group members and active participation. There is no possibility for reasonable evaluation, suitable to all types of students and all subjects. It is possible that by instructing the coordinators and the teachers in general on OCL they may deal with the in-depth application of collaborative learning, so that the disadvantages seem less, and do not limit teaching and learning. In-depth discussion will be presented at the conference.

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MOOCS ARE DEAD! – OPEN EDUCATION AND THE QUALITY OF ONLINE COURSES TOWARDS A COMMON QUALITY REFERENCE FRAMEWORK

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Abstract

This paper presents the current status of Open Education and MOOCs as the main instruments and drivers in the publicity. The evolution from e-Learning towards MOOCs and Open Education is introduced as basis to discuss the main question of this paper: Is Open Education a revolution or are MOOCs only marketing instruments? According to Marx, a revolution is the complete change of the production relations and means and their new ownership and direction towards changed production power. Transferred to Open Education, the current question is whether Open Education is indeed a social revolution for individual learners, educational institutions and the society worldwide or whether MOOCs as the most prominent appearance of open learning are only marketing instruments by the traditional educational systems. The presentation at EDEN Conference 2016 will start the debate and following research will provide further argumentations for future discussions.

Open Education: What is the Current Situation?

Open and Openness are becoming more and more in vogue: It is not a fashion but an increasing requirement due to dramatic changes in societies. Therefore open education is raising interest as well as gaining adaptation, implementations and success. In parallel open research is getting popular through the opportunities for researchers to share their results among themselves. While these developments are taking root, another phenomenon suddenly appeared and changed the public discussion on open courses: Massive Open Online Courses, called MOOCs. This article outlines the relation between these movements and the ("older") E-Learning.

What is Open Education?

Open Education is as manifold as the term openness: It can be related to quite diverse approaches and understandings. Generally, open education is related to learning innovations and learning quality changing the educational environments and offering selections of methodologies, tasks and resources by the learners. Learning innovations and learning quality are important and reflected topics for a very long time from the beginning of discussions and theories about learning processes: In Europe, Plato's Allegory of the Cave is one of the earliest examples. Their debate continued during the introduction of the first universities in the Middle Age and of the school systems in the 18th century. During the last years and the upcoming so called *digital age*, many discussions took place (also in the fields of school and higher education, learning for work and at workplaces as well as non-formal and informal learning) due to the two main changes covering all sectors, branches and levels of the society: first, globalisation and second, establishment of the worldwide internet. In our days, the European Commission has set a new milestone with its policy *Opening up Education* even though it focuses too much new technologies and Open Educational Resources (OERs) instead of new pedagogical methodologies and Open Educational Practices (OEPs).

What is E-Learning?

The term E-Learning is controversial and ambiguous from the beginning: Its introduction is often assigned to Jay Cross but it normally remains unclear for which abbreviation E-Learning stands for. Therefore the term Technology-Enhanced Learning (TEL) is more precise but could not become broadly accepted. E-Learning has existed and been promoted by many experts, professional providers and associations at national, European and international levels (such as EDEN in Europe and ICDE worldwide) for more than 20 years, but has not achieved the awareness and attention of a broad audience and society as a whole. The huge promises from the internet hype at the beginning of this millennium were not fulfilled as predicted: despite the continuous and slowly increasing success and implementations of E-Learning in enterprises, it was not recognized as a driver and enabler for innovation across all educational sectors. Meanwhile E-Learning is normal practice in lager enterprises (95% penetration in companies with more than 500 employees) but not yet widely accepted in other educational sectors.

Dimensions of Quality Development

We could conclude earlier (Stracke, 2015) that the (learning) quality is most important for learning, education and training. The debate on learning quality is very old, but discussions and theories on quality development in learning and education have only been started a few years ago. The concept and philosophy of holistic quality development with continuous improvement cycle was introduced in Japan first and could gain recognition, acceptance and implementations worldwide: A long-term debate has focussed the quality development in general regarding the different quality issues, aspects and approaches (cf. Deming, 1982; Juran, 1951 and 1992; and for an overview Stracke, 2006). In its broad sense it can be defined as “Quality development covers every kind of strategy, analysis, design, realisation, evaluation, and continuous improvement of the quality within given systems”. (Stracke, 2013; p.21). Thus, quality development can be described formally by the chosen scope. Quality is not a fixed characteristic belonging to subjects or systems but depends amongst others on the point of view and scope. The differentiation of the scope into the three quality dimensions Potential, Process and Result was introduced by Donabedian (1980) in the healthcare sector and has become widely accepted. These three quality dimensions are focusing the following questions

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(cf. Donabedian, 1980; for the long-term debate on the quality issues, aspects and approaches cf. Deming, 1982 and 1986; Juran, 1951 and 1992; and Stracke, 2006):

1. Potential dimension: What are the potentials for the quality development in the future?
2. Process dimension: How can the processes be described and optimized for the purpose of quality development?
3. Result dimension: How can the quality development be supported regarding given results and systems?

Quality development requires a long process to be established and integrated throughout a whole organization and in particular the society. Once started, it has to become a continuous improvement circle to be finally successful (Crosby, 1980; Deming, 1986). Quality cannot be described and fixed by a simple definition, because in itself quality is too abstract to have any impact. Therefore, quality has to be defined and specified according to the given context and situation considering the perspectives of stakeholders involved (Donabedian, 1980). It is important to identify the relevant aspects and to specify the suitable criteria. It is necessary to find a consensus amongst the different views and perspectives to gain a common understanding of quality for the given context and situation due to different and sometimes contradictory needs and definitions of quality by all stakeholders (for detailed explanations on context determinations cf. Crosby, 1980; Deming, 1986; Donabedian, 1980).

The question is now: How can quality development be addressed and improved in learning, education and training in our times of the digital age? The concept of Open Education tries to provide a framework in theory and practice for the improvement of the learning quality through the integration of learning innovations leading to opening up the education. Therefore openness and Open Education are becoming not only more and more in vogue but also crucial: It is not a fashion but an increasing requirement due to the dramatic changes in societies.

Quality Dimensions for Open Education

We can transfer and apply the three generic quality dimensions that we have analysed above to learning, education and training in general and in particular to Open Education:

- Learning objectives: To address and exploit the full potential of future learning, education and training and to ensure its best quality development, the learning objectives have to be defined precisely: They have to meet the given situation and target group as the best quality always differs and is dependent on the circumstances and conditions. Sometimes a simple solution is meeting better the learning objectives and needs than a highly sophisticated learning opportunity.
- Learning realization: The learning realization is covering all processes in learning, education and training related to its quality development. That includes the definition

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of learning strategies as well as the design of learning, education and training and its practical implementation, assessment and evaluation in courses and any other learning opportunities.

- Learning achievements: Learning achievements are the results of the realized learning opportunities, i.e., what the learners have learned. We have to underline that this dimension is very different in learning, education and training compared with other sectors: In learning, education and training, the achievements are not a result of a production or service process but are built and achieved by the learners themselves. Therefore the learning opportunities as products of learning providers cannot be judged objectively (like for travel services) but only individually for the specific given learning objectives. And in particular a learner can judge the quality of a learning opportunity only after its completion. Therefore the quality development in learning, education and training is more complex and difficult than in any other sector.

Figure 1 is illustrating the quality dimensions and their application to Open Education:

Figure 9. Quality dimensions in Open Education (Stracke, 2016)

MOOCs Are Dead! – Long Live the MOOCSs?

The new term MOOC (Massive Open Online Course) has immediately attracted the masses even though it is just another label for a diversity of different online learning scenarios and methodologies that were already developed and implemented many years before. MOOCs can be considered and defined as a special type of E-Learning, raising a new interest and offering opportunities to (again) reach learners that are attracted by E-Learning solutions due to many reasons. Thus, MOOCs can be the enablers for a renaissance of E-Learning even though their

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completion rates are very low and their general quality is questionable and currently under lively debate. Nowadays, different types of MOOCs (so called cMOOCs and xMOOCs) are discussed but the focus is still on the masses, technology and promised innovations that are not easily to discover: Most MOOCs are lacking continuous tutoring and support for all learners who are expected to teach themselves. Not only the high drop-out rates have raised the question of quality for MOOCs and several international conferences (such as LINQ 2014) had a special focus on MOOCs. On the other hand MOOCs have prepared the future path for opening up education and currently the European initiative MOOQ for the quality of MOOCs has started to develop a common Quality Reference Framework for improving, assessing and comparing the quality of MOOCs.

Is Open Education the next revolution?

According to Marx, a revolution is the complete change of the production relations and means and their new ownership and direction towards changed production power. Transferred to Open Education, the current question is whether Open Education is indeed a social revolution for individual learners, educational institutions and the society worldwide or whether MOOCs as the most prominent appearance of open learning are only marketing instruments by the traditional educational systems. The presentation at the EDEN Conference 2016 will start the debate and following research will provide further argumentations for future discussions.

Conclusions

This article can only initiate the debate on the impact of Open Education and future research and publications are required to focus and provide more argumentations for further discussions.

We believe in education as a human right and public good and that learning and education have to be changed to keep this status due the major global challenges.

This overview of the quality and future of Open Education and MOOCs presented the needs and potential approaches to meet these requirements and how we can achieve higher learning quality by opening-up education and introducing open learning innovations. We presented current main movements for Open Education such as MOOQ and hope that much more initiatives in theory and practice will take place leading to an increasing recognition and realization of Open Education. As there are much more, we have started to collect them on the portal www.opening-up.education and invite all interested experts and practitioners to share expertise, further initiatives and experiences. We believe in the importance of Open Learning and Open Education for our future and the positive impact on our personal lives and developments as well as on all societies worldwide.

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THE EVOLUTION OF MOOCS AND A CLARIFICATION OF TERMINOLOGY THROUGH LITERATURE REVIEW

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Abstract

Massive Open Online Courses (MOOCs), which are based in approach that offers online courses to great masses in an open and free manner, are a recent trend in distance education and are still under debate. MOOCs developed as an extension of the OER movement, changing and transforming in recent years despite retaining certain aspects. This research follows MOOCs, the buzzword of 2012, in an attempt to study the reasoning behind the recent questioning of their effectiveness. Additionally, the evolution of MOOCs is traced, and new MOOCs with new acronyms are portrayed.

Introduction

Advances in information and communication technologies are forcing educators and learners to break the constraints of time, space, and environment (Lin, Lin & Hung, 2015). While traditional classroom education is well-known, learning systems outside the classroom, especially those enhanced through technology, are still being discussed (Brahimi & Sarirete, 2015). As a disruptive technology (Conole, 2013), and as a recent popular buzzword (Chen, 2014), 2012 was selected *The year of the MOOC* (Pappano, 2012) by the New York Times.

MOOCs are web pages that provide free and high quality educational content cleansed of geographical and time limitations to learners regardless of their physical locations and educational backgrounds (Lin, Lin & Hung, 2015). MOOCs represent the final stage in distance education as they offer open educational resources to students all around the world (Zhou, 2016). In this study, the OER approach and MOOCs as an extension of it are introduced. This is followed by a determination of the threats and limitations directed at MOOCs, resulting in the reasoning behind the emergence of new MOOC variants. An observation was made concerning a significant gap in the literature of the field regarding studies concerning new age MOOCs. In an attempt to reduce the terminological clutter of the field, information is provided regarding the most common MOOC variants. Localized projects and research along with case studies were excluded from this study.

From OER to MOOCs: xMOOCs and cMOOCs

Technological developments take place in cumulative processes. The term *MOOC* was also phased through various evolutions before maturing. Ozturk (2015) states that MOOCs gained prominence through the OER movement. In 2001, the Massachusetts Institute of Technology pioneered OpenCourseWare (OCW) initiative provided open access to course materials on the web to everyone, while the use, modification and redistribution of these materials were licensed (Liyanagunawardena, Adams & Williams, 2013). The term OER was first adopted in the 2002 United Nations Educational Scientific and Cultural Organization (UNESCO) forum (Lin, Lin & Hung, 2015). The open access approach played a key role in the development and direction of MOOCs.

Studies exist regarding the relationship between the first cMOOCs and PLE/PLN environments, which spread with the narrative of open access and personalization (Gillet, 2013; Kop, 2011). From open access to open educational resources, and recently when MOOCs are taken into account, the term *openness* has gained momentum in higher education institutions (Yuan & Powell, 2013).

Following OER, the first MOOC was introduced in 2008 (Yuan & Powell, 2013). MOOCs are designed to be scalable to large online masses with free participation and without any formal requirements (Barnes, 2013), and provide millions of individuals around the world the opportunity to learn through hundreds of public and private universities or organizations worldwide (Margaryan, Bianco & Littlejohn, 2015).

The first MOOC was “Connectivism and Connective Knowledge (CCK08)” in 2008 by George Siemens and Stephen Downes at the University of Manitoba, with 2200 participants from around the world, which was designed on the cMOOC model (Margaryan, Bianco & Littlejohn, 2015). First generation MOOCs were connectivist, student-driven, chaotic, and open-ended (Fini, 2009). These kinds of MOOCs are called cMOOCs. cMOOCs have continued throughout the years through examples such as CCK08 (2008), PLENK2010 (2010), MobiMOOC (2011), EduMOOC (2011), Change11 (2011/12), DS106 (2011/2012), and LAK12 (2012) (Rodriguez, 2013). The cMOOC and xMOOC terminology was coined by Stephen Downes to differentiate connectivist MOOCs from others (Rodriguez, 2013). Unlike cMOOCs, xMOOCs or AI-Stanford like courses are based on cognitive-behaviorist and social constructivism approaches, and are web pages in which the instructor provides courses to a large number of learners through video courses (Rodriguez, 2012). Compared to cMOOCs, xMOOCs follow a more traditional understanding, and are less interactive due to the high number of students. The most well-known examples of xMOOCs are Coursera, Edx, Udacity, Futurelearn, Codecademy and Udemy.

The fall of MOOCs and emergence of new MOOC variants

MOOCs represent the final stage in the educational revolution, offering open educational resources to every student around the world (Zhou, 2016). However, since MOOCs became mainstream in 2012, their completion rates remain a highly debated subject. Jordan (2015) states that completion rates range from 0.7% to 52.1%, and the median value is 12.6%. Another source indicates that the completion rate for MOOCs is fewer than 10% (Daniel, 2012). Chen (2014) indicates the reasons behind MOOCs losing popularity are questionable course quality, high dropout rate, unavailable course credits, ineffective assessments, complex

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copyright, and limited hardware. Schuwer et al. (2015) determined through their analysis of literature that macro level threats towards MOOCs were lack of recognition and accreditation, worries about quality, missing evidence and data, too much regulation, hindering innovation, lack of institutional strategies for integrating MOOCs, sustainability and costs, and inequality in access. Micro threats were determined to be the high dropout rate and low completion rate.

The reduction in favour for MOOCs and loss of popularity has caused the development of different variants. The literature in the field indicates that the most discussed of these is SPOCs (Small Private Online Courses). Evidence of this trend may be seen in the Horizon Report, which makes predictions regarding trends in educational technologies. The Horizon Report from 2013 which predicted "Massively Open Online Courses" (Johnson et al., 2013) changed into the basic approach of SPOCs – *Flipped Classroom* – in the Horizon Report of 2015 (Johnson et al., 2015).

Many other acronyms for MOOC variations appear in the literature of the field. Despite certain studies attempting to provide a classification in the field for this issue (Balula, 2015; Chauhan, 2014; Hoorn & Schuwer, 2014; Naert, 2015; Sanchez-Gordon & Lujan-Mora, 2014; Souto-Otero & Shields, 2015), they appear to lack detail. This study provides information regarding new age MOOCs and their variants, which have emerged due to the diminishing trend of traditional MOOCs. The in-depth literature review conducted for this study revealed 20 new MOOC variants.

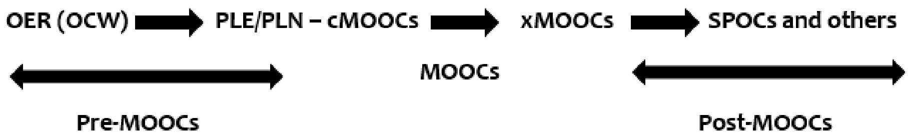

Figure 10. The Continuum of MOOCs

Small Private Online Course (SPOC)

As a result of the increase in student quantity, and the questioning of teaching quality of MOOCs, universities have begun new trends in the post-MOOC age and developed new approaches termed SPOCs (Delgado-Kloos et al., 2015). SPOCs follow the flipped classroom model (Combefis et al., 2014). Through the educational use of SPOCs, students can learn at their own pace, and revisit video courses. They can check on their development through quizzes at the end of videos. Teachers can also evaluate students and measure their skills in a better manner in accordance with the flipped classroom model (Martínez-Muñoz, & Pulido, 2015). Fox (2013) compared MOOCs with the SPOC model and found that enrolment was quadrupled with in SPOCs. Utilizing MOOC material in a SPOC format is a key role in the efficiency of the educational process.

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Big Open Online Course (BOOC)

BOOC was first introduced in 2013 by open and free courses initiated with 500 participants at the University of Indiana (Hickey, 2013a). The greatest advantage compared to MOOCs is the possibility for interactive courses by limiting the number of participants to 500 individuals (Sanchez-Gordon & Lujan-Mora, 2014). Hickey (2013b) indicates that the reason for using "big" rather than "massive" in the definition is due to systems not being prepared for the "massive". Google has provided support for this University of Indiana initiative through Google Course Builder, imbuing further interactive features and providing the opportunity to integrate smaller courses into larger ones. The wikifolio format used in BOOC systems utilize peer-commenting, peer-endorsement, and peer-promotion strategies (Hickey, 2013b). In these courses, the understanding is that the interactive learning environment provided to 25 students may also be applied to 500 students without issue, and as such in addition to wikifolio(s) they utilize peer assessments, formal on-demand assessments, and digital badges (Hickey, 2013a).

Classically Offered Online Classes (COOC)

COOC is a model in which courses are 100% online, which aims to increase quality by focusing on reducing educational costs. In this model the aim is to develop a new model by combining the traditional classroom education model with the strengths of online learning. The fundamental difference between this model and MOOCs is the ambiguity of the concept of openness (Hoom & Shuwer, 2014; Horton, 2013).

Community Open Online Course (COOC)

COOCs are courses focused on group and community work, in which each individual contributes to the course, ensuring that deciding what and how to learn is made easier. COOCs are based on the notion that education cannot be effective if it is limited by universities and other educational institutions, and made rigid by standardization and accreditation, and should instead be based on the concept of personal development wherein learning should be shaped by the curiosity and enthusiasm of individuals (Frsa, 2015).

Digital Open Courses at Scale (DOCS)

Kim (2015) indicates that in DOCS, the terms *open* and *course* remain identical to MOOCs, while *online* is replaced by *digital*, and *massive* is replaced by *scale*. The reasoning behind the use of the word *digital* lies in the fact that courses may be offered through mobile applications rather than through web browsers, and as such the course content may be followed not only via computers, but also using smartphones. The switch from *massive* to *scale* is said to underline the quality of the community and learning process rather than the sheer number of participants.

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Distributed Online Collaborative Course (DOCC)

These courses developed in collaboration with FemTechNet (2013) participants are based on feminist pedagogy and networked learning, and have been adopted by many higher education institutions in the U.S.. The model for the course is based on the principles of distributed learning, knowledge building, and networking (Chauhan, 2014). One aspect in which they differ from MOOCs is that the learning process is distributed and collaborative, where knowledge is not passed on through transmission, but rather established through a process of circulation (Juhasz, 2013).

Game-based Massive Open Online Course (gMOOC)

The reason gMOOCs are called next-gen MOOCs (Jones & Singer, 2014) is that they focus on games and game based learning subjects in MOOCs. Using games, gMOOCs cover complex social objects in virtual gaming environments. They solve real problems in a meaningful way through gamification. gMOOCs stand firmly against older educational systems and claim that the true potential of the learner and instructor can be realized through writing and rhetoric based on meaningful, social, and direct knowledge production (Jones & Singer, 2014).

Hybrid Open Online Course (HOOC)

The HOOC model applied by the University of Pittsburgh offers courses both online and onsite simultaneously. Online and onsite students may participate in sessions synchronously, they may tweet, and they may share their ideas through other discussion applications (Brown, 2015). In HOOCs, focus is gathered on interaction by establishing a bridge between on-campus classes and online classes (Negrea, 2014).

iMOOC

In addition to incorporating established MOOC elements, iMOOCs utilize a hybrid learning model in which Moodle and Elgg learning platforms are integrated. The pilot studies for iMOOC were conducted at the Universidade Aberta (UAb), and it was the MOOC with the highest number of participants conducted in Portuguese. The most significant aspect of the iMOOC approach is the ensuring of a high level of transparency throughout the learning process. Registration is only required on an institutional level, and all content other than registration is available for open access. It is based on both xMOOC and cMOOC principles (Rocio et al., 2015).

Little Open Online Course (LOOC)

The University of Maine at Presque Isle endeavoured to offer small scale high touch open courses, and has started offering its first courses through the LOOC approach, also known as the little brother of MOOCs. These courses are anti-massive, based on a high level of feedback from the instructor, and pave the way for formal credits. Unlike MOOCs, these courses offer personalized feedback and are more localized, smaller scale applications (Kolowich, 2012).

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Local Access Points (LAPs)

The LAPs approach is defined as a type of post-MOOC that increases interaction by physically connecting learners and instructors from a local presence perspective in addition to incorporating videoconferencing, collaborative learning, virtual learning environments, cloud based learning, and rapid feedback (Dominique, 2013).

Local Open Online Course (LOOC)

LOOCs are courses directed at students and teachers in local universities, along with local industries and communities, which aim to effectively utilize social media. They were derived from the lack of coverage by MOOCs and SPOCs. LOOCs not only offer video courses, but ensure all participants in a region are able to meet each other, share information, and collaboratively design the courses (Qarabash & Olivier, 2014).

Massive Open Online Research (MOOR)

As another MOOC variant, the MOOR model was first applied to the Bioinformatic Algorithms course at the University of California (Chauhan, 2014). It is a new MOOC variant that allows academics from different countries, along with learners from different countries and cultures to conduct research together on a global scale (Haider, 2013). In other words, MOOR is the researched focused variant of MOOC (Hosler, 2014).

Micro Open Online Course (mOOC)

The OER Foundation for the OER University (OERu) in collaboration with the e-Learning Research Lab at the University of Canterbury designed a system named SP4Ed. The key characteristic of this case study is that learners are offered connectivist based courses through a small course prototype (Mackintosh, 2015).

Quality/Qualification Massive Open Online Course (qMOOC)

qMOOCs offer an educational framework based on quality and qualification. Three educational paradigms must be achieved in qMOOCs: deep learning experiences, problem-focused education, and 3D virtual immersive environments. The most prominent example of qMOOCs is the MOOCAgora application. In qMOOCs, formal academic degrees are not a primary concern (Mystakidis & Berki, 2015).

Selective Open Online Course (SOOC)

Shimabukuro (2013) specifically compares SOOCs to SPOCs, and indicates that while SPOCs may not always be private, SOOCs may prove more effective than SPOCs. SOOCs are based on the notion that MOOCs and SPOCs must be different and innovative compared to traditional online courses by being more selective. While everyone should be able to apply to a course and no participant limit should be imposed, enrolment should be limited. SOOCs are thus free, but smaller scaled compared to MOOCs (Shimabukuro, 2013).

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Self-Paced Online Course (SPOC)

SPOCs are flexible, open access, online courses allowing the opportunity for independent study in which students may complete lessons whenever they choose and at their own pace (Bogner, Dodd & Rash, 2013).

Social Massive Open Online Course (ECO sMOOC)

The *s* prefix in this MOOC variant refers to *social* in that these types of MOOCs incorporate a greater degree of social interaction and participation; while the prefix is also considered to refer to the term *seamless* in that the courses are accessible from different platforms and may be integrated in real life experiences. Compared to MOOCs, focus is placed on the concepts of equity, social inclusion, quality, diversity, autonomy, and openness. These courses see more frequent application in Europe (Morgado et al., 2014).

Synchronous Massive Open Online Courses (SMOC)

SMOCs aim to achieve the instruction of a high number of student groups with a real time online classroom approach. To this end, SMOCs aim to increase student participation, strengthen the sense of community among students, and establish the classroom sensation through synchronous lessons (UTNews, 2013). The most recent SMOC example from the University of Texas at Austin was conducted with a 10,000-student limit. Instructors offered courses through an xMOOC model by applying techniques such as adaptive learning, group chats, live lectures, online readings, and classroom discussions (Chauhan, 2014). Anyone could attend a lesson conducted on certain days by paying a predefined fee. Learners are not static, but rather in a state of interaction throughout the semester (Straumsheim, 2013).

Vocational Open Online Courses (VOOC)

VOOCs are an approach that is defined by bite-sized training, wherein completion of the course takes approximately 1 hour (Virtual College, 2015). VOOCs differ from MOOCs through different target audiences, different requirements, and different vocational pedagogies. VOOCs aim to provide quick, cheap, easily utilized, scalable, low cost vocational skills (UFI, 2015).

Conclusion

This study analyzed MOOCs and their variant post-MOOCs, derived from the openness movement and OER. Various explanations were provided regarding new acronyms which emerged in the post-MOOC era. The reasoning for this study was the gap in literature regarding a detailed study of this scope. The characteristics of 20 new MOOC variants were portrayed. Despite the literature in the field encompassing other variants and acronyms beyond the 20 examples in this study, such as Regional Open Online Course (ROOC), Massive Open University Course (MOUC), Personalized Open Online Course (POOC), Massive Open Online Discussion (MOOD), the lack of sufficient or reliable sources and detailed information on such acronyms required their exclusion from this study.

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Within the scope of this study, it was determined that while certain new age MOOC variants incorporate very similar methods and approaches, they utilize different acronyms. Some examples were portrayed to have new and innovative ideas compared to MOOCs. Additionally, it was determined that some MOOCs have varying degrees of prevalence in different countries and regions.

The key finding of this study is that MOOCs are variable, adaptable and flexible systems, and a continuation of the permutations of names and acronyms is predicted.

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HOW A MOOC-LIKE COURSE IS FACILITATING TEACHERS' CONTINUING EDUCATION AND TEACHERS' PROFESSIONAL LEARNING COMMUNITY?

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Background

Within higher education, the supply of Massive Open Online Courses (MOOCs) has rapidly increased, both in numbers and in variation of different types. While the literature on different kinds of MOOCs is growing in general, manifested by a couple of systematic reviews (Hayes, 2015; Liyanagunawardena et al., 2013), research on the impact of MOOCs for teachers' continuing education is scarce.

Teachers' continuing education and professional development is high on the political agenda in the Nordic countries. While Finland, Iceland and Denmark already have implemented large education reforms during the last five years, which all have addressed teacher training and professional development. The current governments in the remaining countries Norway and Sweden have made teacher training and professional development, continuing education included, an important issue (Wollscheid, 2015).

In their strategy Competencies for quality, the Norwegian government has defined the goal to provide continuing education and professional development to 10,000 math teachers within 2020 (Ministry of Education and Research, 2012). More generally, in the school year 2015/2016, more than 5,000 teachers in Norway have been offered a program of continuing education. The government strategy of teachers' continuing education emphasizes school-based programs enabling teachers from the same school to cooperate while taking courses (ibid.), and thus, make advantage of *learning communities* (Rismark & Solvberg, 2011) and *collaborative learning* (Vangrieken, Dochy, Raes & Kyndt, 2015).

To address the need for teachers' continuing education and further professionalization and at the same time provide a flexible course supply for teachers, national education authorities launched a MOOC-like course in September 2015, a course limited to two semesters and addressing 5th to 7th grade-school math teachers. The project is led by the Norwegian Centre for ICT in Education, in cooperation with two higher education institutions, and is subject to an ongoing evaluation.

The aim of this paper is to present preliminary findings of this evaluation with particular focus on teachers' perspective as users and learners. Drawing on the assumption that teachers are part of a *learning community*, at their school they are working, and part of an online community, the MOOC-like course participants, and drawing on (preliminary findings) of interview data, the aim of this paper is to describe different types of interactions and types of learning communities, either directly or indirectly related to MOOC-participation.

In the proceeding section, we will briefly review the international literature on teachers as learners in learning communities on the one side and teachers as participants in MOOC-like courses with the means of continuing education on the other side. We will then briefly describe the overall study design, and the methods/data used in this paper. At the end of this section, we will present some working hypothesis, which have lead our data analyses building on interview data with teachers. Finally, we will present some preliminary findings, which we discuss in light of the literature, and provide some implications for further study.

Teachers as learners in learning communities and participants in MOOC-like courses

State-of-the art

In general, Massive Open Online Courses (MOOCs) differ with respect to traditional higher education courses; they are supposed to be open accessible, online and massive (scalability). The first MOOCs were launched in 2008, and fourth years later, the New York Times promoted 2012 as *The Year of the MOOC* followed by the launch of edX by Harvard and Massachusetts Institute of Technology, and other providers such as Coursera. Since then there has been a continuous development in terms of course models, student target groups and variations in terms of openness, scalability and model of knowledge transfer. Speaking of MOOC-like courses in this paper, we focus on a particular type, which has been used for continuous educational purposes, combining advantages of face-to-face online learning situations and advantages of online-learning: small open online courses (smOOC) or small private online courses (SPOOC), which are limited to a certain number of participants, and with the requirement of a participation fee.

Teachers have been a main target group of e-learning courses, since the launch of the first antecedents of MOOCs in the 1960th. Seaton et al. (2015), gives an example of how the Continental Classroom, which applied new technologies, addressed national challenges in terms of education reforms. Several research articles have looked at the potential of MOOCs for teacher education (Jobe, Östlund & Svensson, 2014; Levy & Schrire, 2015; Vivian, Falkner & Falkner, 2014; Zhou, Guo & Zhou, 2015). A literature review by (Saadatdoost, Sim, Jafarkarimi & Mei Hee, 2015; Seaton, Coleman, Daries & Chuang, 2015) has shown that university teachers make up a large group among participants in MOOCs in general, compared to other professional groups. According to a survey of 11 MIT-x-MOOC courses in 2014 with in total 250,000 participants, one of four participants was identified as university teacher. At the same time the survey showed that teachers, more than other professionals,

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were actively engaged in discussion groups. (Seaton et al., 2015) provides a couple of recommendations how to improve courses such as to provide possibilities for interaction, strengthen teachers' network, and use teachers' professional experience. However, limited research exists in terms of continuous teacher education, and teachers participating in smOOC or SPOOCs, with few exceptions. (Zhou et al., 2015). Further, reviewing the literature on study groups Chen and Chen (2015) point out that there is a need for further studies of study groups in the field of online and distance learning.

To our knowledge, only few studies (e.g., Vivian et al., 2014; Zhou et al., 2015), have investigated the importance of MOOC-like courses for school teachers' continuous education. One exception is a pilot study by Vivian et al. (2014) conducted in Australia, investigating a MOOC-like course addressing primary school teachers in teaching computer science, and addressing their needs by opening up for flexibility, spontaneous interactions, support and sharing of online resources. Zhou et al. (2015) stresses the advantages of MOOC-platforms to advance school teachers' collaborate training, social interaction and feedback, in contrast to traditional teacher professional development with shortcomings such as short duration, a lack of theory-practice link and inefficiency.

Research aim

Drawing on these studies on teachers as participants in a *professional learning community* (Westheimer, 2008) (both, online and offline) and participants in MOOC-like courses as a means of further training, our purpose was to explore different types of group interactions and types of professional learning communities related to a MOOC-like course addressing mathematics teachers on primary school levels in Norway.

In this study, we distinguish between two types of professional learning communities of teachers. First, a type of teacher professional community, which stresses learning together with and from colleagues at the same school, and second, a type of teacher professional community across different school sites, the MOOC study group. By the term group we mean "a collection of individuals who share a common social categorization and identity [being a teacher], but the focus remains on individual goals and accountability" (Vangrieken et al., 2015; p.25). More specifically, Zevenbergen (2004; p.6) defined a study group "as a small group of learners (3-6) who formed informal groups that would meet to work on [..] problems related to course material".

At the same time, we can assume that groups of teachers might differ in degree of collaboration with respect to continuous education (ibid.), which might be partly linked to structural factors such as belonging to the same school or not.

Thus, our specific aim was to describe and explore group interactions between teachers from the same school (analogue), teachers from the same teacher network but form different schools, and interactions between teachers in a MOOC-like study group, and how these

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interactions affect their perception of that particular continuous education program, and further, knowledge transfer at school organizational level.

The study: A formative evaluation of a MOOC-like course addressing math teachers in Norway

The original study is an ongoing formative evaluation study of a MOOC-like course addressing 5^{th} to 6^{th} grade-mathematics teachers in Norway (September 2015 – September 2016) commissioned by the Norwegian Center for ICT in Education. To investigate a broad range of topics on two different levels, user level (teachers, school leaders, pupils), governance level (funding; higher education institutions cooperation with project leader), we triangulate both quantitative and qualitative methods and data. Data collection included semi-structured interviews with teachers, school leaders, pupils and higher education institutions providing MOOC-like courses, observational data of participating teachers in online study groups, document analyses (strategic documents) and a teacher survey. The data has been treated confidentially, and none of the informants can be identified in this publication. The study was approved by the Norwegian Social Science Data Service (NSD).

Focusing on teachers and teachers' professional learning communities, this paper draws on interview data of a subsample of teachers, principals and pupils (each lasting between 30 until 45 minutes) at two primary schools in the Eastern part of Norway, one in a municipality in Oslo (school A), another in a more rural community (school B). Both schools were located in a typical *middle class area*, similar in terms of number of pupils (approximately 300), staff number and composition of pupils. During the interviews, the researcher took extensive notes, further validated by audio-recording.

Data analysis

This paper presents preliminary findings from semi-structured interviews with teachers, school leaders and pupils at two case-schools focusing on the user perspective of cooperative learning, and discusses these findings in light of findings in the international literature on teachers' continuing education and teachers as participants in MOOC-like courses. Interview notes were read several times, and openly coded, according to the overarching topics, interaction and professional learning communities.

Results

Description of two case schools

In terms of number of participants in the MOOC-like course in mathematics, the two schools were different. In school A, only one teacher did participate in that particular course, while at school B, four teachers participated, two 4^{th} grade teachers and two 6th grade teachers. At school B we conducted a focus group interview with the four participants.

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Types of group interactions

Table 1 provides themes and subthemes generated by in the process of reading and coding interview notes.

Table 1: Types of group interactions

Theme	Subtheme	School A	School B
MOOC-student group	Relations	Teacher knows one of the participants from earlier, and has met two participants in other contexts.	Four participants from the same school; two 4th grade teachers, two 6th grade teachers
	Interaction (student-to-student)	Separation of the groups in two parts. Some members appear to do quite well, as they talked and came up with reflections, while others are relatively unprepared, according to our informant. Two participants identified by our informant who are mainly coming up with reflections, while the majority contributes with some minor comments.	
	Interaction (supervisor to student)	Low interaction with supervisor	Low interaction with supervisor
School-based professional learning group (analogue)	Relations	Communication with one colleague at the same school participating in another continuous education program.	informal meetings with colleagues study lessons with colleagues (study group)
	Interactions (colleague to colleague)		
Across-school based professional learning group (analogue)	Relations	with three earlier colleagues, who now work at different schools	with two colleagues from the neighbour school (the same school district) on municipality basis
	Interactions School-based knowledge transfer	Informal knowledge sharing among colleagues	School district meetings Informal knowledge sharing among colleagues

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Discussion

Addressing the discussion of an increasing need to facilitating teachers' continuous education by using flexible models, such as MOOC-like courses, in many countries, the aim of this paper was to present some preliminary findings of a small case study in Norway, a formative evaluation of a MOOC-like course targeting mathematics teachers (5^{th} to 7^{th} grade), with particular emphasis on the potential for group interactions within and across MOOC-like groups, and school-based professional communities, in addition to school-based knowledge transfer initiated by course participants.

Drawing on interview data from two case schools, our findings reveal that MOOC-like groups (digital) to a little degree facilitate interactions and strengthen school-based and across school professional teacher communities, if all participants come from different schools. On the other hand, if teachers from the same school or/and the same existing professional network, participate in the course, this MOOC-like course appear to facilitate school-based professional communities and knowledge transfer. In terms of teacher-student interaction within a MOOC-group, it appears that teachers or facilitators do not intake a clearly defined role. Our informants expressed that they did not understand their teachers' role.

Focusing on different types of group interactions between teachers, this paper draws on preliminary findings from interview data with teachers at two schools in Norway participating in a MOOC-like course targeting mathematics teachers in grade 5-7. Further data analyses will triangulate interview data with observational data of participating teachers in interaction with online-group members and their supervisor (in one group) and a survey data of a larger sample of teachers with the aim to describe different types of group interactions (online, offline) between teachers across and within the same school.

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EXTRACURRICULAR VOCATIONAL TRAINING IN HIGHER EDUCATION: RESUME OF EXPERIENCES AFTER TEN YEARS OF PRACTICE

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Introduction

With the implementation of the Bologna process in Germany, curricula – originally designed for diploma and magister programs – had to be transferred to three-year bachelor programs. The general purpose was to enable university students to enter the world of works with a qualified (academic) degree earlier.

In the context of the German language speaking countries, unique characteristics were required for the new academic bachelor degree in distinction from the regionally traditional (non-academic) bachelor degrees, which were provided by the industry and the chamber of crafts after three years lasting apprenticeships (Dobischat et al., 2008). Different to the modus operandi *learning on the job* as it is the rather common concept outside the German-speaking countries, the education of apprentices in industry and crafting disciplines is not limited to the particular tasks arising from the daily business in an employing enterprise but, within the particular branch, they are expected to being practically prepared for the full range of tasks from any kind of job. For that purpose, the apprentices are demanded to visit a branch-related school for professionals, which ensure that even very specialized enterprises can employ apprentices. In these schools, lectures are provided on general job-related theoretical knowledge and hands-on training to achieve the full range of practical skills. In order to receive the degree, apprentices must prove their abilities in theoretical and practical exams. The difficult competitive situation for the academic bachelor degree holders particularly gets obvious when it comes to apprenticeships with the purpose to educate assistants for academic disciplines, like biological, chemical and architectural assistants, system programmers, and management assistants in the health industry. Another difficulty for the design of the academic bachelor degrees arose from the demand that education in universities generally is expected to be fully sustainable (timeless). Teaching application-related competences in the framework of academic education as demanded by the industry is understood as a contradiction against this very basic principle: Applications, however mainstream they might be used in a specific field, might easily be substituted as soon as new technologies emerge.

During the redesign of the curricula, most of the theoretical contents from the prior diploma and magister programs eventually were adopted for the new bachelor curricula on the cost of practical experiences, which the students earlier achieved in the context of several seminars, field trips, and hands-on trainings. While the understanding of basic principles and methodologies was focused, practical research skills were reduced to a minimum assuming that these were rather irrelevant for the work in the industry but exclusively required for academic working purposes. Consequently, related practical research skills and experiences were related to the consecutively designed master programs. These were meant to establish the beginning of an intended academic career. It is still not fully clear which specific abilities distinguish academic bachelor degree holders from non-academic bachelors in terms of advantages on the job market at entry-level. Sure, academic bachelors have a deep general understanding of the context and above that, also a basic understanding of typical strategies, measures, and theories, which the non-academic bachelors lack to a large extent. Just, at least for the first years of employment, enterprises still perceive a higher return of investment if employing the cheaper non-academic bachelors who far quicker can fully be integrated within current work processes.

The program erp4students was 2006 launched with the purpose to solve the found educational dilemma. Since it was designed as an extracurricular offer, the basic principle of sustainable education in universities was not in danger. In this paper, first, the program itself is being introduced according to its contents, structure and demographic development, and afterwards, so far made experiences are discussed alongside with the results of our latest quality-related questionnaire.

The program erp4students: Course offer, processes, and implemented quality strategy

Without excluding the theoretical understanding of the field, the educational program *erp4students* offers learners the opportunity to intensively engage with practical aspects of Enterprise Resource Planning (ERP). In today's world of work where just a little percentage of enterprises remains without the support of Information Technology, understanding and to know how to deal with ERP systems is fundamental for a big part of the work force. However, the program does not focus the learned lessons on the in-depth understanding of the underlying theoretical concepts and mechanisms of ERP (such are focused in detail within our basic lecture in the context of Information Systems). Instead, basic theoretical understanding is provided and the students are led through many hands-on sessions in order to achieve practice-relevant competences in working with the world's leading ERP software, which, with a market-share of 24% (2013), is the solution of the SAP SE (Colombos, 2014).

In the launching year in 2006, a single course on Integrated Business Processes with SAP ERP (TERP10) was exclusively provided in German language to students of our own university. Nowadays, the program erp4students covers a total of thirteen courses, most available at least

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in German and English language, some additionally in Spanish and Russian. Figure 1 shows the current offer.

Issue	Course Content	Languages
SAP ERP	Integrated Business Processes with SAP ERP (TERP10)	DE, EN, ES, RU
	SAP ERP Customizing I (Beginner)	DE, EN, ES
	SAP ERP Customizing II (Advanced)	DE, EN
	Introduction to Enterprise Resource Planning	EN
SAP BW	SAP BW I (Beginner)	DE, EN, ES
	SAP BW II (Advanced Business Intelligence)	DE, EN
	SAP BO - SAP BusinessObjects and SAP HANA	DE, EN
	Data Warehousing (Beginner)	EN
SAP CRM	SAP CRM (Beginner)	DE, EN
SAP PPS	SAP Productions planning und control I (Beginner)	DE
	SAP Productions planning und control II (Advanced)	DE
ABAP	ABAP I (Beginner)	DE, EN
	ABAP II (Advanced)	DE, EN

Figure 11. The program *erp4students*: offered courses

Figure 1 displays all presently offered courses regarding the targeted issues of SAP, the expectable course content, and the languages, in which the courses currently are available. Further course translations are in progress. All courses in *erp4students* are driven by case studies: For each case study, learners first study 50-100 pages of theoretical background in printable PDF-documents, particularly designed for self-learning situations. Subsequently, they apply their achieved knowledge through practically completing a realistic ERP-specific case study within the original SAP-environment. Knowledge is transferred to a deep level of understanding, which – after a reflection phase – eventually leads to competences. This concept is the same for all case studies. For any problems the learners experience, tutor support is available 24 hours/seven days a week; response times to incoming requests often are below one hour. Even though such a round-the-clock supervision is challenging to facilitate, students repeatedly reported it as the strongest asset, which they – even in Germany where university education is expected to being free of charge – are willed to pay for. The program is made for its learners and not for profit. Thus, it was possible to keep the expenses on a manageable low level. After the successful completion of all case studies within a particular course, the students receive a certificate from our university. These in-house certificates are not just confirmation letters signifying a course-completion, but the students can use them to ask their home university for recognition of the credit points (we recommend to do this before starting). Additionally, these certificates are the precondition to register for the official SAP examinations with a massively reduced fee (only available for current university students). These examinations can be taken at defined locations at fixed intervals.

For the initially launched course in 2006, a total of 63 students from the University of Duisburg-Essen registered. In 2015, students from 110 countries registered for 5,200 courses. Through the whole period, the course completion rates were above 80% (in Austria even

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above 90%). We assume reaching this very low dropout rate also because the participation is not fully free of charge, but still well affordable for university students.

Figure 2 displays all relevant processes to maintain *erp4students*, starting with the registration procedure and ending with the submission of certificates. Three different groups of active entities are involved, which are the learners (dark grey), the tutors (here: Tutoring System; light grey square in the middle of the figure) and the administration (lower light grey square). Some of the administrative processes are fully automatized.

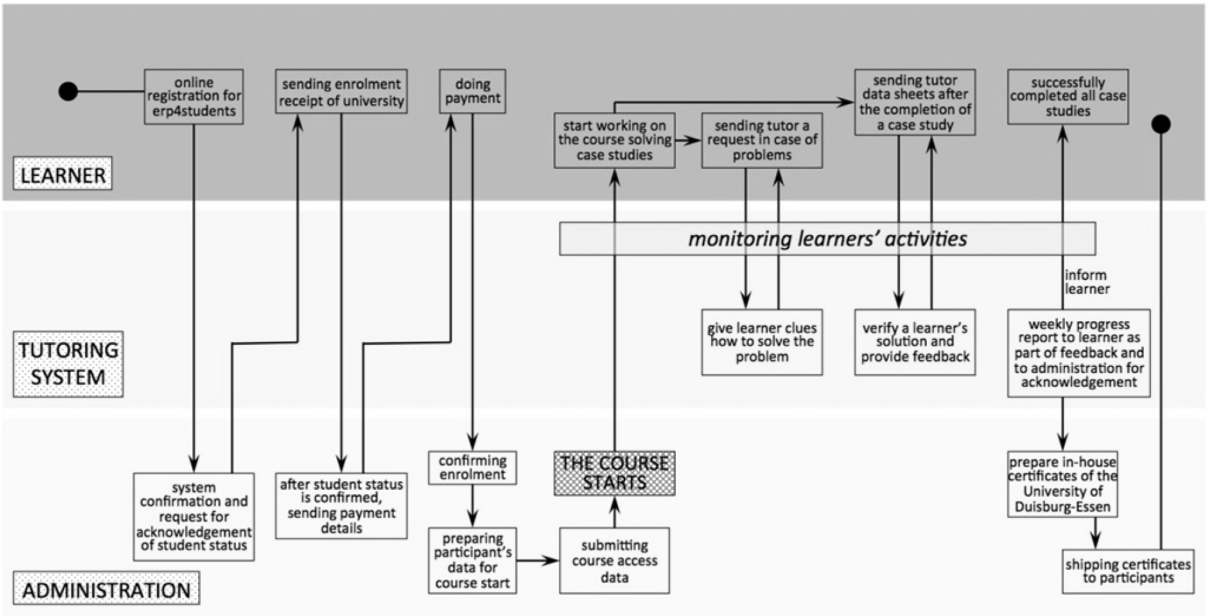

Figure 12. Processes and active entities in *erp4students*

The whole set of processes is implemented as a dialogue between a student (in the upper frame), the tutoring system (in the middle frame), and the administration of *erp4students* (in the lower frame) and can be subdivided into three distinct sets of sub-processes (from left to right):

1. The online registration process includes the transmission of relevant personal data, the choice of a course and the completion of the payment procedure. Learners and administration are involved.
2. The course itself starts with the completed enrolment (dark field in the lower centre) and after a learner received the course access data. From here, mainly the learners are the active entities, but the progress is steadily monitored, and the learners are fully supported by tutors.
3. After a learner successfully completed all case studies, the certificates are being delivered.

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Since *erp4students* is an extracurricular offer, it is crucial for the students that they can work within their own pace, spending time to work when it is available. While due to administrative reasons, all students within one semester get access to the system at the same time. However, they can start with and complete their courses whenever they are ready. The course end is defined through a fixed deadline.

In case of difficulties, which appear to overburden the learner, the tutor is to be contacted. Assumed a learner provided all relevant details, the tutor returns clues in order to support the finding of an own solution, else, the tutor might ask for more details. As a first step, the learners are encouraged to discuss their issues with other learners in the forum. We found that due to the very different learning paces and schedules of the learners, they prefer immediate solutions so that they have a chance to seamlessly go on with their work. However, our general strategy is not to support the learners through immediately solving their problems, but instead, giving them clues on how to help themselves. This approach proved to enable the learners to develop competences for problem solving in general and for the practical work with ERP systems, in particular. When a learner finished a case study, the related data sheets are submitted for evaluation to the tutor (an active process, initialized through the learner). The tutor verifies the correctness and provides feedback regarding the quality of the solution. If the solution actually meets the defined requirements, the case study is being closed. The successful completion is included in the weekly progress report, which the tutor submits to both the learner as a part of the constant feedback loop and to the administration for purposes of documentation.

Once a learner has successfully completed all case studies within the course, the last set of sub-processes is initialized: First, the tutoring system informs both the learner and the administration of this new status quo. Subsequently, the administration prepares the in-house certificate of the University of Duisburg-Essen and ships it to the learner.

In the end of each course period, the learners are asked to complete a feedback questionnaire on a voluntary basis as a means of the implemented quality strategy. This strategy follows the first part of the German quality concept *Qualitätsplattform Lernen* (Quality Platform Learning), which describes a holistic quality approach basing on three sections, i.e., the quality of educational offers, the basic quality of organizations, and measures for excellent quality in organizations. The chosen first part of the concept deals with the request for a transparent provision of information regarding the educational offers, related to clear definitions of target groups and purposes, full transparency regarding the chosen approaches for didactics and methodology, used media, implemented roles, tasks for each of the roles, measures to control learning success, technological issues, and evaluation. In this particular approach, several national and international standards have been united (Arnold et al., 2013).

While most instruments for quality assurance are implemented a single time during the phases course planning and production, the student evaluation questionnaire is a repeatedly used instrument for ongoing quality control. With the responses from the students, their

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satisfaction is measured. The responses and suggestions for improvement are compared with the results from earlier semesters in order to recognize the success (or failure) of implemented improvements. Suggestions and complaints made during the course runtime (towards the tutors) additionally are collected and fully considered in terms of finding further improvement potential. The short online questionnaire, however, is used as the central instrument for the related data collection.

As a novelty in the winter semester 2015/16, we extended our quality framework by implementing the Learning Culture Survey as an additional tool (Richter & Adelsberger, 2016). The Learning Culture Survey was designed for the analysis of culture-specific perceptions and attitudes of learners in terms of different educational aspects like the presumed role and expected tasks of educators (distinguishing lecturers and tutors), perceptions of and preferences regarding feedback, time management, motivation, gender issues, group-work related issues, etc. (Richter, 2014). For this purpose, learners are asked for their evaluation of 102 statements on the basis of agreement or disagreement (using a four-point Likert Scale). This was the first time to implement the questionnaire exclusively in the context of an online program. From prior implementations in the context of face to face education in universities and enterprises (professional training), we already knew that there actually is a common and relatively persistent (at least over four years) country-specific learning culture in higher education and that gender differences occur in just a small number of the considered issues (Richter & Zelenkauskaite, 2014). However, it still was unclear if online students would express the same perceptions like students in face-to-face education.

Implementation and Findings

For its first implementation in the context of *erp4students*, the online questionnaire was completed at the beginning of the course period by 100 randomly chosen participants from Germany. We expected to get insights regarding our participants' perceptions and expectations of extracurricular learning, which primarily should lead to an improvement of the provided tutorial support. Most participants of *erp4students* currently still have their origin in Germany, so that this context was most appropriate for a related investigation. While the total amount of registered learners from foreign countries already is remarkable, the hitherto registered numbers of participating foreign students per country is too low to reasonably drive culture-specific conclusions. In future, as soon as the numbers of learners from particular foreign countries increase, the Learning Culture Survey shall also be implemented in other national contexts. For comparative reasons, we additionally extracted a random sample of 100 responses out of our existing data pool from over 2,000 sample elements from the German traditional higher education context, which we collected during the course of the last years. We wanted to know if the scenario online and face-to-face education would show different results.

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In the following, we focus on the most relevant issues of the questionnaire for our extracurricular vocational online education i.e., time management and services expected being provided by the tutors. Particularly the large questionnaire section related to group work has no particular relevance in the context of *erp4students*. In order to grant the students that they can work in their own pace and schedule, no tasks are designed to being solved in groups. In our latest feedback questionnaire, we explicitly asked the learners if they wished additional networking functionalities available through the platform, which clearly was denied. Thus, it is not planned for the nearer future to implement related functionalities. However, when the program is further expanded within the Asian context where social interaction has a far higher value in the context of learning, it still might become a relevant feature to ensure learner satisfaction.

Time Management: When do you do your work?

In this section, we wanted to know when learners complete their work and particularly, if asking for extension of deadlines is a general or rather an individual issue within a particular society. In former investigations we found that students, particularly from countries where higher education is not free of charge, appear to expect more flexibility regarding set deadlines. Directly after the table with the found absolute values, the percentage of positive evaluations (fully agree & agree) is subsequently displayed in the figure. A brief discussion follows.

Table 2: Time Management: German higher education vs. *erp4students* (absolute values)

When do you do your work?	higher education (n=100)			erp4students (n=100)		
	# p	# n	# n.a.	# p	# n	# n.a.
as soon as I received the task	70	29	1	81	19	0
I finalize my work on the point	79	20	1	83	15	2
deadlines are difficult for me	48	48	4	31	56	13
I often do not meet deadlines	8	79	13	3	79	18

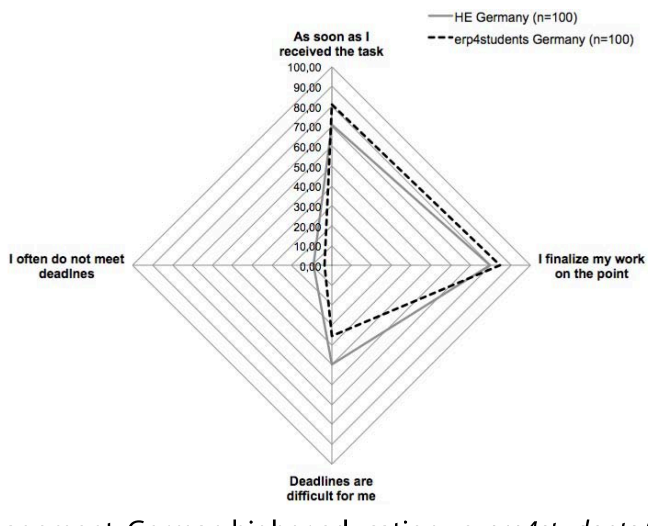

Figure 13. Time Management: German higher education vs. *erp4students* (percentage positive answers)

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Figure 3 shows that the learners in our extracurricular online program appear to struggle less with set deadlines than their colleagues in f-2-f education. A possible reason could be the fact that they explicitly decided to take the additional extracurricular course, which means that they were fully aware of the necessary involvement from the beginning. Using all the available time, they appear to start their work earlier but rather finalize tasks on the point.

Tutor: Which tasks and responsibilities do you assign?

This section is highly relevant for *erp4students* since the success of our program is directly related to the satisfaction of our learners with the tutoring services. Also here, the figure displaying percentage values of positive answers follows directly after the figure. We found amazingly little differences between the results from the traditional face-to-face setting of higher education and the context of extracurricular vocational online training in *erp4students*. Two aspects, however particularly raised our attention.

Table 3: Tasks and responsibilities of tutors: German higher education vs. *erp4students* (absolute values)

Which tasks and responsibilities do you assign to tutors?	higher education (n=100)			erp4students (n=100)		
	# p	# n	# n.a.	# p	# n	# n.a.
provide technical support	79	18	3	88	12	0
provide preselected contents	88	10	2	85	15	0
support org. of my learning processes	88	11	1	85	15	0
support indiv. information research	80	18	2	79	20	1
evaluate results, knowledge, dev.	54	42	4	74	25	1

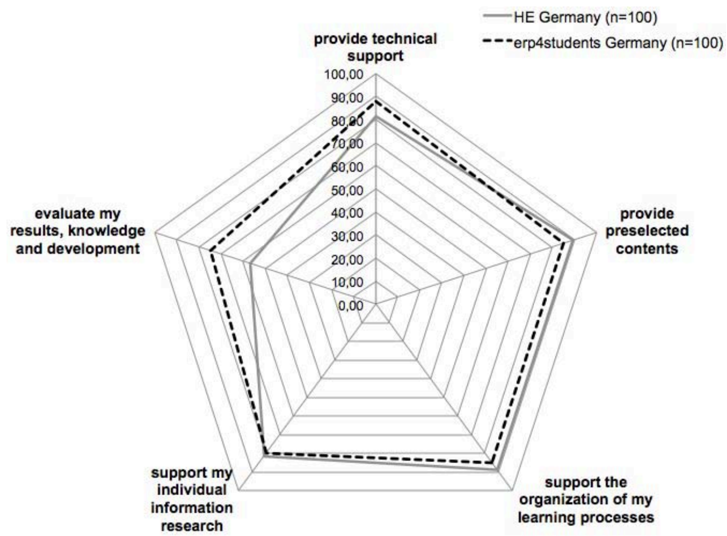

Figure 14. Tasks and responsibilities of tutors: German higher education vs. *erp4students* (percentage positive answers)

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As shown in Figure 4, the evaluation of results, knowledge and development (progress) is more expected in the online program than in the traditional learning form. We see the reason in a shift of responsibilities: While in the traditional higher education (at least in smaller classes), the professor usually is responsible for the evaluation and the tutor supports the professor, learners in *erp4students* do not have direct contact to a professor at all. As further (slight) differences, the online learners appear to be better self-organized (and thus do not expect tutors to support in this issue as much as in traditional education) and rather tend to expect receiving technical support in order to ensure that they can freely work in the system without spending unnecessary time for technical issues.

Conclusion

Compared to our results from the traditional face-to-face education, we found just a small number of differences in the responses of the learners in our program *erp4students*. The differences we eventually found were directly related to the specific conditions of our program. However, we yet cannot determine if the found differences actually were related to the online learning scenario, to the additional workload for the learners as *erp4student*s is an extracurricular program, or to the fact that the students have to pay a fee for participation. Further investigations are required for this purpose. However, the Learning Culture Survey as a means for quality management appears to being fully applicable in the context of online learning.

While we generally were looking for a way to simplify the administrative efforts with the increasing number of learners, we actually learned that a redesign in terms of automated feedback as usual in MOOCs appears not being suitable. Our established individual and prompt tutor support is considered a major success factor.

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BUILDING TOGETHER EFFICIENT, TARGETED AND LONG-LASTING E-TRAINING: EXPERIENCE FEEDBACK FROM THE UTOP PROJECT

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Introduction

The question of continuing education and lifelong learning is central in our society, where traditional jobs evolve and require new skills, and where new jobs continuously appear. According to *Beyond Knowledge* publication of CEGOS (www.cegos.fr) in June 2015, it's difficult for the continuing education in Europe to be a strategic priority in companies, with the exception of the United-Kingdom. Distance training increases even in France where its proportion is low compared to Germany, Italy, Spain and United-Kingdom (between 25-30%). In France, the public higher education institutions hold only a few percentage of the FC market (6-7%).

This crucial field of professional development is most of the time not really well developed within our universities, and there is no dedicated place to make companies and universities working proactively and reactively together. It is the reason why the French Digital Thematic University called UNIT (Université Numérique en Ingénierie et Technologie) decides to launch a big initiative called Utop, that has been supported by the France PIA 2 IDEFI program. The main objective of this project is to create a kind of marketplace where companies, whatever their size, can ask for a specific education plan, where universities can collaboratively design an answer to this demand, and where users can find an indexed catalogue of all the available online curricula or modules.

This paper aims at describing in a first section the Utop, project and its objectives; the second section is dedicated to the way it has been implemented. The third section deals with some feedbacks from the first realisations of the Utop project, before a conclusion on how this new environment participates to the design of a new answer to the growing demand on lifelong learning, vocational development and re-qualifying education.

The uTOP initiative

UNIT (Université Numérique en Ingéniérie et Technologie: www.unit.eu) is one of the 8 French Thematic Digital Universities (TDUs) supported by the French Ministry of Education, Higher Education and Research. The TDUs are networks of universities and engineering schools working collaboratively to create a national high-quality educational resource bank for the whole university community (academics and students). TDUs are organised by disciplinary fields and UNIT is the TDU dedicated to Engineering and Technology. UNIT is a Foundation open to all public and private actors of HE in Sciences and Technologies who agree that it is more efficient and rational to mutualise and to share knowledge and projects, and look together for co-financing system in the field of the digital for education.

In 2011 UNIT, in line with its members, decided to tackle the challenge of developing a focused and balanced approach to support the collaboration of companies and universities for the establishment of a coherent and high quality online offer. Therefore UNIT designed a new initiative called Utop. The uTOP project is one of the winners of the *Investment for future program*, IDEFI (Initiatives d'excellence en formations innovantes), launched in 2011 by the French National Research Agency (http://www.agence-nationale-recherche.fr/en/project-based-funding-to-advance-french-research/). This call for projects, aimed at supporting symbolic and innovative projects regarding higher education.

The *IDEFI uTOP project* is a *multi-partners* project which federates around UNIT its 60 members. This network is composed of actors in digital education such as CNAM (National Conservatory of Arts and Crafts), on-line IUT (University Institute Of Technology), Universities and Engineering schools (Telecom Institute, Telecom Lille, Écoles des Mines, ENPC (French National School Of Civil Engineering), ENSG, Universities of Valenciennes and Lorraine), research actors in Robotics (INRIA, GDR) and companies (Orange, Aldebaran, Géoconcept). uTOP works as a *marketplace*. It is a hub, a place of confluence between training demand and supply, organizing *multi-partners* projects. The uTOP project aims at building an offer of long life trainings on a model, adapted to the French context, of open digital university, addressing the national and international market, first and foremost the Francophony. Its purpose is to become a *bridge* between higher education, business and research worlds.

The *IDEFI uTOP project* can be viewed as a demonstrator, over 5 years, of an open digital university of technology.

Furthermore, by developing new partnerships, uTOP is able to create distance training answering needs for various branches of industry as aeronautics, rail, sustainable development, biomimicry, building information modelling (BIM), surgery, IT security, etc.

uTOP proposes modular, customizable and business-oriented distance training in addition to the long life trainings already proposed by its partners. The main goal is answering, in a cooperative way, to the requests of companies and the evolution of the job market.

Actions aiming at the sustainability of the uTOP project are in progress to develop, after market studies, an ambitious offer of scientific and technical trainings. The objective is to maintain the search for additional public and private partnerships, and to create a long-lasting structure beyond the project IDEFI. uTOP project is widely opened on the international, first and foremost the countries of the South.

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uTOP implementation

uTOP project confirms the concept of *multi-partners digital open university* around:

- three sub-projects of experimental distance training associating economic and territorial players:
  - trainings valuing the results of the research in computing and robotics fields,
  - trainings for the economic revitalization of a territory,
  - broadcasting of distance trainings in the Geomatics field at the national and international levels;
- open projects, in response to required specification:
  - digital and innovative co building training,
  - in response to demonstrated and identified needs,
  - economically viable.

UNIT Foundation provides governance, coordination and sustainability. A Steering Committee defines the strategy and checks achievement of objectives. It is based on an executive committee to operationalize the strategy, accountable to the Steering Committee and coordinate project teams. The selection process for the trainings to develop is based on a call system supply and a selection committee.

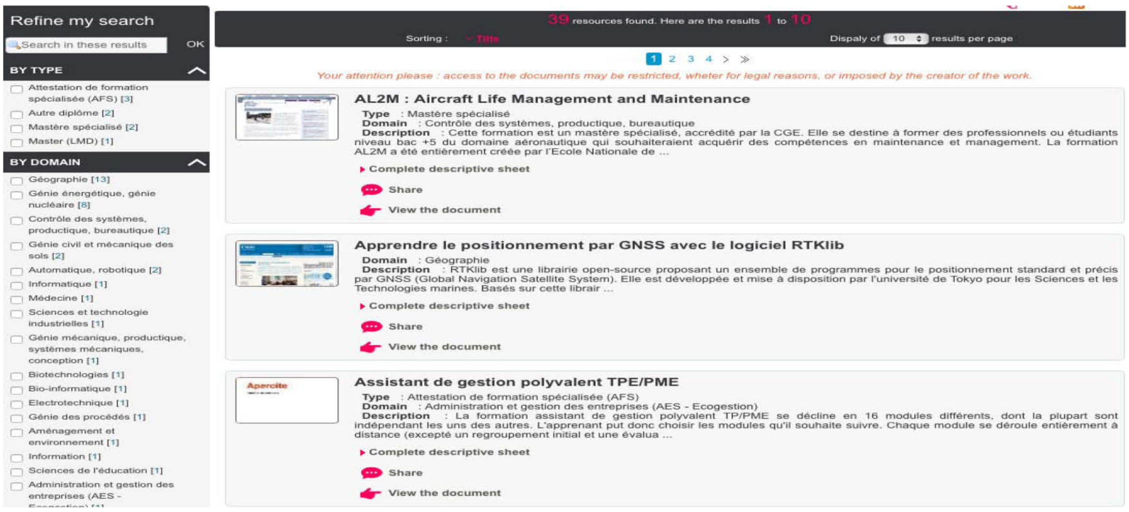

Figure 15. Example of trainings indexed on uTOP portal http://www.utop.fr

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Feedback from the Utop project

INRIA MOOCs experience

INRIA (www.inria.fr/en) created a MOOClab, designed to develop MOOCs to facilitate transmission between basic research and industry. In this framework, four MOOCs were realized by the MOOClab with the support of Utop and co-funded by INRIA and Utop. These four MOOCs are broadcasted on the French national MOOC platform called FUN-MOOC (France Université Numérique: www.fun-mooc.fr) in 2015:

- Semantic Web and Web of data;
- Biocomputing: algorithms and genomes;
- Binaural Hearing for Robots;
- Mobile Robots and Autonomous Vehicles.

Figure 2. Example of a MOOC indexed on uTOP portal and broadcasted on FUN https://www.fun-mooc.fr

For the two first MOOCs (Semantic Web and Web of data, biocomputing), developed in French language, for learners with a Licence (L) or Master 1 degree, a rough analysis shows in particular:

- between 3,500 and 4,000 subscribers;
- in Biocomputing: approximately 500 were up to the end and obtained a certificate;
- 2/3 of learners are French;
- 1/3 of learners are from foreign countries, mainly from Maghreb, Senegal and Ivory Coast;
- there was a strong participation in quiz and forums.

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The two other MOOCs, about robots, are developed in English, for learners with a Master2 degree, and are dedicated to sharper problems:

- between 1,000 and 1,800 subscribers;
- Respectively 75 and 89 learners were up to the end and obtained a certificate (between 5 and 8%);
- 1/2 of learners are from Germany, India and United States;
- 1/3 of learners are from Maghreb, Senegal and Ivory Coast.

uTOP project gave INRIA the opportunity to work on valuing the results of the research in computing and robotics fields, especially for companies. Furthermore, iuTOP helps INRIA to attract students to the research sector, helping them to discover this not very well know universe and the careers opportunities attached.

Trainer's training

Between 2014 and 2015, a workgroup finalized the distance training *Discovery of e-learning* and organized a personalized training for future tutors. Finalization of the distance training took the form of several significant actions:

- Production of training resources and teaching aids (video, animations, MCQ, etc.);
- Integration of 2 training courses and specific tools on a Moodle platform;
- Elaboration of a guide and measurement tools for a test remote training course;
- Animation and evaluation of training plan in life-size test with a group of about ten participants;
- After the test, correction and adjustment of the training plan.

The training, given in French, is now open on the uTOP website (http://www.utop.fr).

Relationship with private sector and industry

The variety and the diversity of the uTOP actions put its academic members in training relationships with several companies as:

- POMA, which is an 80 year-old world leader in ropeway transportation, with subsidiaries on five continents (www.poma.net/en/);
- Rail companies and competitiveness poles (grouping of companies, Universities and Research centre);
- Civil aviation, Airbus SAS and Aviation Institute of Maintenance;
- Biomimicry, with the first European Excellence Centre dedicated to Biomimicry, CEEBIOS (Centre Européen d'Excellence en Biomimétisme de Senlis). "The project is ambitious and innovative: build a unique place, recognized and renowned for the

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promotion and development of biomimicry as a tool for scientific and societal transition at the international level" cf. Website – www.en.ceebios.com);
- "Building Information Modeling" with Bouygues, Eiffage and Vinci and Architects. The main actors of French, and international, building construction are involved in the co-construction of the Master's degree, which was created in their request.

All these initiatives bring answers for skills evolution of companies' employees. Without uTOP and its multi-partner approach of co-construction and collaboration, these actions would not have been able to be started.

Conclusion

The uTOP project has realized its main objectives and can be considered as a real success thanks to:

- 39 courses and over 2,500 hours;
- 26 internal partners for a common goal and mobilization of over 100 external partners in a multi-partnership approach.

The uTOP project is now an actor located bridging the gap between business and higher education institutions, in the field on online education. In a relatively short time, it succeeds in developing a framework for the facilitation of the collaboration, the promotion of online curricula. The uTOP project supports and funds the development of several online training, some are open and free for the learners (such as the ' MOOCs previously described) and some others not, some are very short (4 weeks) and some much longer (9 months for master degrees).

Above all, uTOP supports his partners in the implementation of long-lasting economic models in distance training. The creation of profitable trainings allows a return on investment towards uTOP and thus to develop new projects, in services of individuals, companies and economic world.

This initiative should not be limited to France. Next step for uTOP is to extend this approach to future partners in Europe and all over the world.

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AUGMENTED LEARNING ENVIRONMENT FOR WOUND CARE SIMULATION

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Introduction

Emerging technologies for teaching and learning have made it possible to create environments, scenarios and virtual patients that simulate clinical practices in order to promote the development of skills and knowledge in healthcare education (Lewis et al., 2005; Hogan, Sabri, & Kapralos, 2007). These simulations are seen as educational techniques that bring interactivity and immersion into the learning process, allowing the recreation of clinical experiences without the risk of causing harm to patients (Maran & Glavin, 2003). Other known advantage is the possibility learners have to practice an unlimited number of times a procedure or technique until correct realization, before applying it in real-world scenarios (Rey et al., 2006).

Virtual reality (VR) and Augmented reality (AR) are examples of emerging technologies for teaching and learning that allow the creation of digitally enhanced learning environments. These technologies are expected to have an impact in education, as highlighted by the Horizon report for Higher Education in 2010, 2011, and most recently in 2016 (Johnson et al., 2010, 2011, 2016). Regarding healthcare education, several studies indicate the positive effect of AR and VR in developing decision making skills and practical procedures using virtual simulators, with a higher impact on non-experienced participants (Zhu et al., 2014).

However, using VR in healthcare education can be a debatable approach since it immerses learners in a synthetic environment, enabling them to see the surrounding real-world. Acting in a different environment from which learners will have to act in real life scenarios is another concern to take into account. According to Ellaway (2010; p.791):

> *"(…) in medicine and medical education aspects of virtual reality have found their way into the mainstream through the use of 3D animations, digital imaging tools that can make 3D models (…) and more interactively through the use of synthetic worlds such as Second Life and haptic simulators for technical procedures such as laparoscopic surgery.*
>
> *A key limitation however for virtual reality in medical education is that it requires participants to step away from the environment in which the practice*

> *for which they are preparing takes place. Virtual reality is therefore essentially divergent from real world practice and the embodied experiences within it."*

In AR environments digital objects are added to the real-world, enhancing it and not replacing it. AR is a technology that allows the integration of virtual objects into the physical real-world. It supplements the real world with virtual objects in a way that they seem to coexist in the same space (Zhou, Duh, & Billinghurst, 2008). The combination of real with virtual, real time interactivity and three dimensional (3D) virtual content are the three commonly accepted characteristics of AR systems provided by Azuma (1997). In this way, AR plays an important role in education, as the 2011 Horizon report states:

> *"Augmented reality has strong potential to provide both powerful contextual, in situ learning experiences and serendipitous exploration and discovery of the connected nature of information in the real world." (Johnson et al., 2011; p.22)*

This paper describes part of a doctoral study where the effect of AR in nursing student's decision making skills was investigated, by comparing the usage of a virtual simulator in wound care diagnosis and treatment, with and without the support of AR to visualize the wounds.

A literature review was conducted to identify, select and critically analyse the effectiveness of AR in medical education. Web of Science (https://www.webofknowledge.com) was used to retrieve all studies until 29 July 2015, according to the following query: *augmented reality OR mixed reality AND medical OR healthcare AND training OR education*. In total, 43 studies out of 163 were selected to review, after excluding papers that focused only on VR, telemedicine, technical equipment, veterinary or exclusively related to medical practices and not educational.

According to this literature review, AR is used in several disciplines of medical education, with a higher incidence of studies related to the training of laparoscopic surgery (Botden et al., 2008; Feifer, Delisle & Anidjar, 2008; Oostema, Abdel & Gould, 2008; LeBlanc et al., 2010, Brinkman et al., 2012; Nugent et al., 2013; Vera et al., 2014), surgical puncture (Vikal et al., 2010; Yeo et al., 2011; Ungi et al., 2012; Moult et al., 2013; Nugent et al., 2013; Sutherland et al., 2013) and neurosurgery (Luciano et al., 2011; Alaraj et al., 2013; Mitha et al., 2013; Abhari et al., 2015). In general, AR has shown to be an effective tool to develop clinical skills when compared with other methods, with a greater impact on inexperienced learners, and its transfer to real world scenarios. AR in medical education is seen as a safe simulation method to practice unlimitedly clinical procedures, without the risk of harming real patients.

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Materials and Methods

Equipment

A web based learning simulator (e-Fer, requires an account to access and is available online at http://e-fer.ipleiria.pt) that holds several virtual cases of patients with chronic wounds was developed by Monguet et al. (2009) to improve wound care training. The clinical cases were developed by healthcare specialists and include a detailed description with pictorial (real picture of wounds) and non-pictorial information. The e-Fer simulator allows users to simulate decision-making when treating wounds, providing immediate feedback to the answers submitted (Figure 1). The main goal is to promote the healing of the patient's wound by selecting the best diagnosis and treatment solution, in this order.

The effectiveness of e-Fer was demonstrated by Costa (2010), showing that students developed their skills in all assessment parameters – infection, type of wound, type of tissue, wound cleaning, wound-dressing material and complementary procedure – except for the wound depth. The e-Fer simulator saves all participants data in a file that can easily be extracted for further analyse of performance.

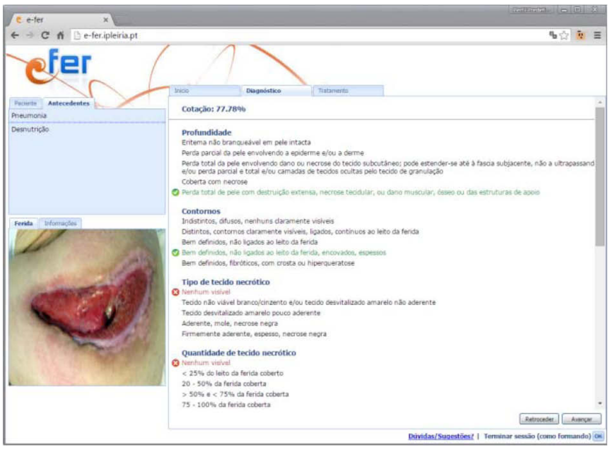

Figure 1. View of a clinical case in the e-Fer web based simulator that shows feedback given after answer submission

The AR component was created using user-friendly technology, both for the production of the 3D objects and its implementation in an AR mobile application. For this study 6 clinical cases were created and added to e-Fer.

The objects for these new cases were produced using Autodesk® 123D® Catch (http://www.123dapp.com/catch), a software that generates 3D objects based on several pictures taken from different angles, as shown in Figure 2.

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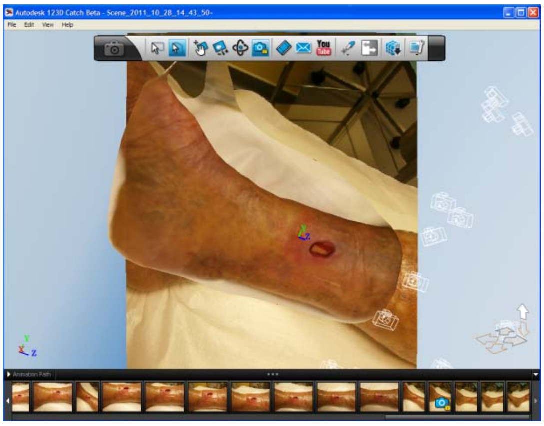

Figure 2. Creating a 3D wound with Autodesk® 123D® Catch

After producing the objects the files were uploaded to ViewAR, a software that uses printed markers to show the 3D objects in AR, when detected by an iPad with the application installed (http://viewar.com). At the moment this software is only available for commercial use. Alternatives to create AR experiences: Aurasma https://www.aurasma.com (free); Augment http://www.augment.com (30 day trial version).

Sample

In total, 54 participants completed the 4 week training period on wound care using the e-Fer simulator. All participants were Nursing students in their first year of study with no previous clinical wound care experience. Informed consent was given by all participants, who voluntarily participated in this study.

Procedure

A quasi experimental study with pre and post test was conducted with 54 participants that started the activity by solving clinical cases on e-Fer during 2 weeks. After this period participants were split into control group (n = 24) and experimental group (n = 30) for the second part of the activity. The control group kept solving clinical cases as they were used to in the e-Fer simulator. The experimental group also solved the clinical cases using e-Fer, but observed and analysed the wounds with AR (Figure 3).

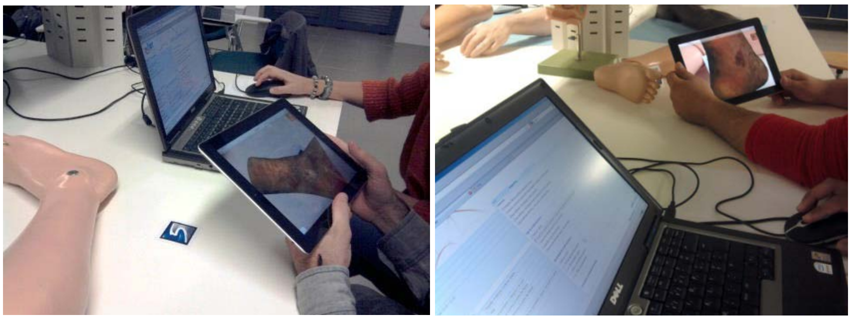

Figure 3. Students from the experimental group solving clinical cases with e-Fer while using AR to observe the chronical wounds

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Since the e-Fer simulator is web based, participants could solve the clinical cases at their own time and pace. However, due to technical reasons, a room with 4 laptops and 2 iPads was arranged in order to facilitate participants from the experimental group to carry out the activity. After 4 weeks the data with the participants' performance was extracted from e-Fer. All data from the 4 week period of training was extracted only in the end, since it could easily be split into pre test and post test data by dates. In this way, the data from the pre test corresponded to the first 2 weeks, whereas the data from the post test corresponded to the last 2 weeks.

Data analysis

All data was extracted from the e-Fer simulator, processed and analysed anonymously using Statistical Package for the Social Sciences 20.0 for Windows (SPSS Inc., Chicago, IL). The Mann–Whitney U test and Wilcoxon signed-rank test were used to compare and analyse the differences in performance, between and within groups respectively. A P value < 0.05 was considered statistically significant.

Results and discussion

The results after statistical treatment of the data extracted from e-Fer are based on the correct number of answers per clinical case given by students. The Mann-Whitney U test was used to compare groups. As shown in Table 1, no statistically significant differences were found between the two groups in the pre test, which validates the homogeneity of the groups before manipulating the independent variable, when both groups were using the traditional e-Fer without AR.

Table 1: Parameters of both groups (n = 54) in the diagnosis and comparison (Mann-Whitney U test) in the pre test

Parameters	Control (n = 24)		Experimental (n = 30)		Mann-Whitney U test
	M	SD	M	SD	P value
Depth	2,47	1,49	2,37	1,14	0,924
Edges	2,08	1,07	2,01	0,87	0,828
Type of necrotic tissue	2,20	1,14	2,15	0,98	1,000
Amount of necrotic tissue	2,24	1,11	2,09	1,04	0,531
Color of surrounding tissue	2,04	0,89	1,89	0,73	0,554
Granulation tissue	2,15	1,05	2,08	0,83	0,979
Epithelial tissue	2,41	1,09	2,32	0,92	0,958
Wound type	2,79	1,65	2,64	1,42	0,754
Infection	2,86	1,66	2,74	1,47	0,774
Diagnosis (total)	21,23	10,87	20,28	9,14	0,889

In the second moment, when the experimental group used e-Fer with AR, statistically significant differences where revealed in all parameters, except for the Type of necrotic tissue, as shown in Table 2. The means (M) obtained by the experimental group raised significantly in the second moment, while the control group had a similar performance.

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Table 2: Parameters of both groups (n = 54) in the diagnosis and comparison (Mann-Whitney U test) in the post test

Parameters	Control (n = 24)		Experimental (n = 30)		Mann-Whitney U Test
	M	SD	M	SD	P value
Depth	2.03	0.99	4.28	2.18	0.000
Edges	1.86	0.79	3.72	1.56	0.000
Type of necrotic tissue	1.92	0.93	2.29	1.10	0.182
Amount of necrotic tissue	1.85	0.89	2.85	0.80	0.000
Color of surrounding tissue	1.83	0.91	3.52	1.31	0.000
Granulation tissue	1.78	0.96	2.48	0.97	0.002
Epithelial tissue	2.27	1.35	4.14	1.20	0.000
Wound type	2.38	1.47	4.69	1.58	0.000
Infection	2.43	1.51	5.13	1.91	0.000
Diagnosis (total)	18.35	8.92	33.10	11.05	0.000

In the treatment phase no statistically significant differences where revealed in all parameters, after applying the same statistical tests to the extracted data. In fact, it's in the diagnosis phase that observing the wound is critical for a correct decision. In the treatment step, observation takes a secondary role, since it depends on the correct diagnosis previously realized.

In this way, observing the wound with AR proved to have a positive effect in the overall diagnosis phase on the experimental group, with highly statistically significant differences ($P < 0.001$).

Conclusion

The e-Fer is an online clinical decision-making simulator used in the initial training of nurses, allowing to simulate the diagnosis and treatment of virtual clinical cases of chronic wounds. In this study an AR component was added, with new clinical cases, creating an augmented learning environment where students could observe the 3D chronical wounds in a more realistic and natural way, simulating real practice.

The goal of this investigation was to verify if AR enhances the development of clinical decision-making skills in wound diagnosis and treatment. The results showed that AR enhanced students' performance in wound diagnostic parameters, with highly statistically significant differences ($P < 0.001$) in the Mann-Whitney U and Wilcoxon tests.

As for many studies of AR in medical education that were found in the literature review, we are aware that the size and convenience of the sample limits the generalization of these results. However, we believe that this study may represent another step in creating augmented learning environments, closer to what students will encounter in real-world scenarios, and that the intelligent use of technologies like AR is making possible.

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BRIDGING THEORY TO PRACTICE THROUGH A FLIPPED CLASSROOM APPROACH IN AN ENTREPRENEURSHIP COURSE

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Introduction

While entrepreneurship education (EE) finds itself middle in a debate of whether entrepreneurship can be taught or not, it has more relevance today than ever before (Neck & Greene, 2011). At the University of Pretoria, the focus is on starting up businesses, self-employment and creating employment. While the curriculum is set and allows little foray, lecturers strive to improve the quality of teaching and learning, making the best use of the available infrastructure, class-time and technology. There is a lively debate on the merits of teaching traditional lecture-based classes versus using technology for teaching, and how they can be improved, blended, hybridised or flipped. In the developed world with ubiquitous access to technology and internet, flipped classroom teaching has become synonymous with blended learning and very much the norm. While video lectures are not new, the affordances of videos, screencasts, audio lectures and the like can add real value to a flipped classroom. It is in this arena that a third-year course in entrepreneurship was flipped in 2015, and reported in this article. The study investigates both the instruction method as well as the application of theory through tutorials.

This study focuses on how to apply theory to practice in a representative way in an attempt to simulate a real business experience. According to Sams and Bergmann (2013) lecturing may not be the best use of in-class face to face time. Therefore, this study explores the use of teacher created videos that students could watch in their own time at home or on campus and then come to class to practice what they have learned, thus flipping the classroom. Students watched the videos outside class to master the theoretical component of the course. This was followed by a tutorial in class to apply the theory in an attempt to engage students in higher-order thinking. Tutorials used case studies that linked to a real life business that provided students with an opportunity to experience, to apply theory in practice and receive feedback as they developed new abilities. It also allowed the lecturer to check understanding and to explain unclear interpretation. Therefore, the purpose of the study was to investigate student perceptions of the benefits of using videos and tutorials to link theory to practice.

Literature review

Entrepreneurship education

Entrepreneurship education as an academic and practice field is booming (Neck & Greene, 2011). As in any field of research with a practical application, there is a need to reflect on the effectiveness thereof (Fayolle, 2013). Furthermore a study on the effect of classroom-based entrepreneurship courses indicates that the entrepreneurial intention of students was not significantly affected (Støren, 2014). This testifies to the need for different pedagogies. The constantly changing world and business environment have important consequences for entrepreneurship education, entrepreneurial learnings and competencies, needed to effectively function in modern societies (le Roux, 2015). In devising EE programmes, it is important to also reflect on the target population and educational objectives, given that one size does not fit all (Rideout & Gray, 2013). As Fayolle (2013) points out the beneficiary of EE is the society in which it is embedded and practitioners need to consider which pedagogies adequately meet the social and economic needs of all the stakeholders involved. The realm between entrepreneurship activities and national economic development is inseparable. Tang, Lai, Chou and Chen (2014) further argue that EE can elevate national entrepreneurship standards and the innovative abilities of individuals. Such education requires development of innovative entrepreneurial competencies, thus moving away from only knowing facts to a way of thinking and acting (Gibb, 1993). For the purpose of this study an attempt is made to close the gap between what we teach and what entrepreneurs do. The prime challenge in EE is understanding the theory and then connecting theory to practice. Case studies are believed to be effective in achieving the above.

Flipped classroom

While lecturers claim personal connection and communication taking place in class and students expect traditional lectures at University, using class-time for lecturing is strongly contested (Albó, Hernández-Leo, Barcelo, & Sanabria-Russo, 2015; Bishop & Verleger, 2013; Breivik, 2015; Sams & Bergmann, 2013), as teachers claim that they do not make the best use of the time with students physically in class. Students in lectures adopt a passive attitude to learning (Kellogg, 2013), while there is mostly very little interaction among students or between lecturer and students. Teachers are not able to differentiate instruction during a lecture according to student progress levels (Sams & Bergmann, 2013). While some students find it hard to focus their attention in class, lectures seldom foster learning or higher-order thinking (Breivik, 2015; Sams & Bergmann, 2013). The time is ripe for flipping the classroom. We follow the restricted definition of a flipped classroom where video lectures (and not only prescribed readings) are provided for outside class learning, and problem solving activities in class, with no lecturing taking place in classtime (Bishop & Verleger, 2013).

Instructional lectures featuring large amounts of conceptual content translate successfully to rich media formats including videos, online presentations or interactive content, replacing class-delivered lectures (Albó et al., 2015). Criticism against videos includes possibilities of being impersonal and overrated learning-tools, that compare poorly with lectures that

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supposedly contain interaction (Breivik, 2015). Ash (2012) relates more criticism against video teaching, as it is only a better version of undesirable teacher-centred and lecture-based pedagogy. Flipped classrooms may fail due to boring video lectures that inevitably lead to poor class attendance (Kellogg, 2013). Breivik's research, however, found that students quickly adapted to video lectures and liked the flexibility. Videos can provide effective overviews or illustrative examples showcasing diverse situations and cases (Breivik, 2015; Maina & Alsina, 2015). Students benefitted from taking notes without missing lecture content, while some found it easier to focus attention on videos than in class. They also watched at convenient times and re-watched videos to prepare for exams (Breivik, 2015), eventually spending more time on the subject than otherwise. Pre-reading from textbooks for homework rarely happens (Kellogg, 2013). Students learnt better from videos through listening to the subject being "talked", that made understanding easier (Breivik, 2015). Being able to view the video multiple times, as well as pause and rewind, also aided understanding the content, particularly for students who struggled with the language (Sams & Bergmann, 2013). Video therefore provides multiple representations of information accommodating diverse learners who prefer visuals, audio or text (Sams & Bergmann, 2013).

Students prefer doing interactive activities in class over lectures (Bishop & Verleger, 2013). Therefore the active content engagement traditionally reserved for homework is moved to class, joined by active, problem-based learning activities founded upon a constructivist ideology (Albó et al., 2015). There they solve problems, and apply their knowledge in new contexts (Kellogg, 2013). The classroom becomes a student-centred environment, where they complete tasks at higher-order cognitive levels like apply, analyse, evaluate and create (Sams & Bergmann, 2013). If the difficulty level of the in-class problems is too high, it meets resistance from both students and faculty (Kellogg, 2013). Li et al. (2015) emphasise the vital importance of instructor-student interaction in flipped courses. Claims of classes being depersonalised by the videos, were refuted by Breivik (2015), whose students developed a close relationship with their teacher and reported that it was easier for them to ask questions during the "workshops". In class, when relieved from lecturing, a teacher can spend more time with individual students, including those who struggle, while other students have the freedom to learn independently (Tucker, 2012).

Course redesign for flipping is hard work, but doing it well improves the quality of teaching as well as learning (Tucker, 2012). Well-executed flipped classrooms are better structured and organised and lead to better learning outcomes, independent learning and critical thinking (Atef, 2015; Breivik, 2015; Kellogg, 2013). Students have more autonomy in a flipped classroom, feel in control of their learning as they follow their own pace (Breivik, 2015; Li et al., 2015). Learner-centred flipped classes also facilitate active interactions among learners (Atef, 2015).

The research question was informed by Sams and Bergman (2013): "Flipped learning is not about how to use videos in your lessons. It's about how to best use your inclass time with students". Because the critical importance of the classroom component, where activities should be designed to address student-centred learning (Bishop & Verleger, 2013; p.3), this

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research focused equally on the students' perceived value of both video and classroom components. This leads to the formulating of the research question namely: How do students experience the different components of the technology-enhanced flipped classroom in entrepreneurship?

Context and teaching intervention

The study was done in a third year B Com Entrepreneurship course in the faculty of Economic and Management Sciences, Department of Business Management at the University of Pretoria. Thirty students enrolled for the 14 weeks' duration course that was facilitated and managed by a senior lecturer. The following topics were covered in the course: The model for business growth; dynamics of growth; managing the venture life cycle; growth strategies and methods; business turnaround and financing growth. Each topic was covered in one or more chapters in the prescribed textbook, and as such identified. Videos were professionally recorded and consisted of the lecturer outlining the topic, explaining the concepts in the topic with the help of PowerPoint slides, graphs and relevant visual material that were cut into view. Concepts were also illustrated with examples from the business world. Videos were published as unlisted content in YouTube, and then shared by embedding in the university's Blackboard Learn CMS (course management system). The accompanying PowerPoint slides were uploaded into the CMS and released simultaneously with the videos a week before the planned tutorial on each topic.

Three contact sessions of fifty minutes per week were assigned to the course of which two adjacent slots allowed for application of theory. The third time-slot was earmarked for self-study of the videos on campus for the benefit of students with inadequate access to ICT. No formal face-to-face lectures took place. Contact time was used for a tutorial where case studies of on-going businesses were analysed, and students first formulated answers individually, discussing answers in a small group to decide on the best answer to report. The groups presented their answers to the peers, ensuing in class discussion on the given answers and feedback from the lecturer to fill in the gaps and clarify uncertainties. After every unit a short written assessment was administered to determine how well students have learned the concepts required and to avoid students falling behind. Thus the activities used in the course were both theoretical and practical with the opportunity to apply theory to practice. After the last videos and practical tutorials, students reflected on their learning.

Research methodology

The research approach in this study was interpretive, using both qualitative and quantitative methodologies. Data were sourced from anonymous written feedback provided by students at the end of the semester. In two questionnaires, students had to rate different characteristics of videos and tutorials using a simple 3-point scale. Those responses were numerically weighted, with 0 for *Not Important*, 1 for *To some extent Important* and 2 for *Very Important*, the weights added and the characteristics sorted accordingly. The questionnaire also contained open-ended questions where students could reflect on how the tutorials or videos helped them. Written feedback was captured electronically and thematically analysed using

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computer-based qualitative analysis software, ATLAS.ti™. The same code set was used in analysis of both questionnaires so that themes could be compared between the two. These findings would ascertain how the course components in the flipped classroom contributed to integrate theory and practice. To ensure transparency and validity in the process, coding was checked by two seasoned academics, resulting in minor re-naming of categories.

Findings and discussion

The findings report the benefits that students perceived they gained from taking part in a flipped class approach, as captured in their reflections and the research questionnaire. The qualitative findings were interpreted using the guidelines of Sams and Bergmann (2013), Ash (2012) and Tucker (2012) to understand perceived benefits in an entrepreneurship classroom. Rating the characteristics of the videos, showed in decreasing order: Having another resource in addition to the textbook (53); View it again to understand better (51); Use for revision (50); View again for deeper insight (48). It showed that videos were highly rated as an additional resource. Almost equally important was the ability to view them more than once whether to understand better, for revision or gaining deeper insight. Many students reported viewing slides more than once, and opening the slides at the same time as watching the video on that topic, which was confirmed from logs in the CMS.

The students also rated the characteristics for the tutorials. The ratings were: Having another opportunity to engage with the content (53); Answer aspects you did not understand (53); Link to theory & real world (52); Wider understanding of topic (52); Learn to think critically (50); Solve problems (48) and an Opportunity to communicate clearly (40). The first four characteristic received a very similar rating, all indicating that most students needed to engage again with the concepts. It is clear that the case study application helped with understanding, allowed for theory to be linked to practice and clarify uncertainties.

Qualitative analysis of the open-ended questions that required reflection on the two teaching modes yielded rich thematic material. The open-ended feedback on the videos and tutorials was coded and the roles of each resource in the flipped classroom were compared.

Table 1: Codes and themes in feedback compared

Theme	Total codes	Codes	Feedback on videos	Feedback on tutorials
Student learning activities	68	Understanding the Content	23	15
		Learning, Repetition, Remember and Own Learning Preferences	29	1
Link Theory, Apply	42	Applied to Real World and critical thinking	12	30
Teaching Resource	31	Summaries, Outline	12	
		Explained, Elaborated	10	
		Supplemental Teaching Resource	9	
Others	8	Assessment, Collaboration	1	7

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It is seen in Table 1 that three main themes surfaced during analysis, with by far the most comments representing value to student learning activities (total of 68 codes). Videos were reported as contributing very strongly to this theme, particularly Understanding the Content (23 codes) as is illustrated in the following quotes:

> *"The videos helped me to understand better and clear misunderstanding"*
>
> *"The videos helped to gain a deeper understanding and insight regarding the content"*
>
> *"The combination of videos and tutorials is a brilliant way to learn, understand and apply theory"*

Videos also prominently added value by enabling independent learning, video being easier to understand, while repetition helped with remembering the content longer and in that way helping learning. The pace of lectures does not suit everybody (Li et al., 2015). The students confirmed that videos made it possible to be more autonomous in their studies, as reported by Ash (2012), that in self-paced flipped classes, previously unchallenged students could fly through the work, while others needed to move slower, while others did not maintain any pace. In this specific entrepreneurship class, all students progressed as planned, because they were third-year students in their last semester before graduation, and aptly motivated. The videos were close to their personal or preferred way of going about learning the work. This is an interesting finding, as some literature describes videos as teacher-centred and representing little more than lecturing in another format (Ash, 2012). The students therefore reported on how videos represented their own learning preferences (13 codes):

> *"The videos gave me the opportunity to work on my own and at my own speed"*
>
> *"It allowed for studying in a more personal way"*
>
> *"It allowed me to view it over and over again, not a once off as a lecture"*

Students also perceived the videos as a useful Teaching Resource and mentioned many of their advantages. The codes indicate that the biggest contribution videos made, was adding organisation through summaries and outlines, while explanations and examples supplemented the other learning material. They were better than a once off lecture, and could be combined with notes and slides. The students reported on the advantages of video as resource as follows:

> *"I don't like to read so listening to the videos and making notes worked better for me"*
>
> *"It explained the work better than the text book and answered all my questions"*

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> *"The videos gave a different way of explaining theory which helped to clear misunderstandings and helped me with interpretation"*

Video lectures are effective for conveying large amounts of content, (Sams & Bergmann, 2013). These findings confirm students' note-taking behaviour while viewing videos (Breivik, 2015), their lack of enthusiasm for reading, and understanding the content better due to the explanations in the videos (Sams & Bergmann, 2013). These videos clearly contributed significantly to the learning, despite being teaching resources that required little active engagement from students. Findings on the videos agree to some extent with Ash (2012) who stresses the need to engage students, for watching the videos does not signify engagement.

In this course viewing the videos was a prerequisite to do the application in the tutorial class, where knowledge gained from the videos was applied to a case study. Feedback on tutorials (Table 1) confirmed that applying knowledge after mastering the content improved understanding, helped the students in the entrepreneurship course to structure their thinking and made it easier to understand. The class became a place to solve problems, advance concepts and collaborate with peers, findings that confirmed the literature (Li et al., 2015; Tucker, 2012). Learning activities included structuring thinking and working through case studies to improve understanding, assumedly through the lively discussions and feedback, that is suggested by references to collaboration (7 codes). The findings confirm literature (Bishop & Verleger, 2013) that proposes that a flipped classroom should promote student-centred active learning activities to do in class. Lively debates on the finer points of the theory often ensued in the tutorials. Students reported on learning within the context of the tutorial as follows:

> *"Helped me to structure my own thinking and better understand the content"*

> *"Helped me to work through the case study on my own and understand the theory better"*

> *"It was easier to understand the work when applied to a case study and then discuss it with the group"*

The most significant contribution that the tutorial classes made, was providing the platform to apply learning theory to the real world, apply to business cases, while examples were reportedly better than the textbook. Applied critical thinking was also attributed to the tutorials. The students reported the applied learning as follows:

> *"It gave practical cases of how to apply the theory to a real business"*

> *"Made the theory more practical, discussing with my friends, using real life business cases and also explained the work in more detail"*

> *"It linked the work to the real world of business and work"*

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These findings clearly affirm Tucker's (2012) suggestion that it is not the teacher-created instructional videos alone, but how they are integrated into an overall approach that makes the difference. The videos greatly improved understanding and learning, as an additional resource was highly valued for structuring content and allowed students to re-visit, revise and study autonomously, while tutorials improved the understanding further, and particularly linked the theory to the real world, providing the key to bridging theory and practice in entrepreneurship.

Conclusions and recommendations

Before a student can bridge from theory to practice, a solid understanding and knowledge of theory is needed. Videos can therefore be regarded as very successful tools to support mastery of theory. Understanding and learning the theory, particularly within students' preferred learning style, all point toward student initiated activity, representing by far the most salient theme in the qualitative analysis. Considering that lecturing is regarded as passive and lecturer-centred, and videos as lectures that have just switched delivery mode, the students in this study reported the value of different independent learning activities taking place in response to watching the videos, suggesting that the videos used in this course were more student-centred than lectures. A seasoned lecturer knows what the difficult concepts are, anticipates the misunderstandings and from experience uses illustrative examples and applications in an organised well-planned, and -executed video. The tutorials were the opportunities where the application of theory in the real world had most value and two-way bridges between theory and practice were built, with understanding improving further. This confirms the superior teaching value of the flipped classroom, particularly when complicated theory has to be understood and applied in practice, which clearly will not happen to any great extent in a classroom lecture. Not only did the flipped classroom provide opportunities to identify knowledge gaps (Li et al., 2015) but also allowed for some lecturer-student interaction, peer-interaction and collaborative learning. Interacting with students while applying their knowledge to a case study helped to clarify, simplify and address confusion but also provided guidance, an opportunity to critically analyse and solve problems while creating an opportunity for deeper learning.

The study has implications for both educators and practitioners. Linking case studies to real business benefit students by exposing them to the world of work and practice. It can be applied across disciplines and is therefore ideally suited in many higher education subject areas. It helps students not only to master theory but also to understand and apply what they have learned in a wider context. The study therefore confirms the notion that education is capable of making a significant contribution to the development of well-rounded individuals ready to enter the world of work.

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ESTABLISHING OPEN BADGES IN EUROPE – THE OPEN BADGE NETWORK

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Introduction

Mozilla Open Badges are Web-enabled tokens of learning and accomplishment (Casilli & Hickey, 2016). The Mozilla Open Badges initiative and the Open Badges Infrastructure (OBI) both advocate badges as open micro-credentials which can be used as indicators of skills, achievements or credits for all types of learning (Knight & Casilli, 2012). Open badges are unique in that they are information-rich due to the embedded metadata as well as interoperable due to the open standard. Since the introduction of open badges in 2012, a number innovators worldwide have developed both technical solutions to extend and optimise the badge system and educational programs focusing on issuing, earning and sharing open badges. The open badge community has been growing ever since with both global and regional initiatives enhancing the uptake of badges and badging systems. One of such initiatives is the Open Badge Network (OBN), an Erasmus+ strategic partnership, which brings together organisations from across Europe to support the development of the open badge ecosystem, promoting the use of open badges to recognise all forms of learning. This paper introduces the project Open Badge Network and its mission to promote Open Badges in Europe. First, it describes the emergence and development of Open Badges technology, projects and initiatives since 2011 until 2016 including the establishment of the Open Badge Network in 2015. Then it discusses Open Badges from three perspectives, i.e. (a) as an *open infrastructure* (technical perspective), (b) as *open educational practice* (educational perspective), and (c) as an *open movement* (sociological perspective), and go on to illustrate how these three perspectives are reflected in the vision, mission, activities and outcomes of the Open Badge Network (OBN). The paper closes with recommendations for promoting and establishing a European network aligned with the Open Badges standard, practice and movement.

The emergence and development of Open Badges

Open Badges emerged in 2011 together with the foundational white paper authored by the Peer 2 Peer University (https://courses.p2pu.org/en/) and the Mozilla Foundation (https://www.mozilla.org/en-US/foundation/) (P2PU, 2014). This first badge framework outlined the key elements of an interoperable, decentralised, open badge system for connected learning, including badges, assessments and an infrastructure for issuing, collecting and sharing of badges. This first paper took a look at how learning is occurring outside of formal contexts and how learners are pursuing self-directed learning supported by online resources and communities. The conclusion was that while online learning opportunities, communities and resources are sufficient to support any learner, there are no means of recognising knowledge and skills acquired in such contexts. The authors argued that since traditional systems of educational and job-relevant accreditation require enrolment in formal programs and institutions, the outcomes of informal learning, e.g. in online settings, remain invisible and unrecognised both by the formal educational and by the career systems. Another key issue raised was the drawback of formal systems of accreditation not accounting for incremental learning, i.e. a history of how skills were developed over time remains indiscernible. Based on these observations, the authors set out a future vision of a system which would support skills to be captured more granularly across different contexts, collected and associated with an online identity and displayed to various audiences, including potential employers, mentors, peers and collaborators (P2PU, 2014; p.3). The evidence for such learning would be acquired in different ways, e.g. (a) automatically from interactions with content or peers, (b) through various assessment types, or (c) based on nominations or endorsements. With learners actively seeking learning opportunities, developing skills by following multiple pathways and creating own connected learning ecologies, this self-directed, interest-driven learning would be systematically supported and acknowledged to make skills visible, available and viable for career development, school acceptance, mentoring opportunities and personal development. Acting as bridges between learning contexts, badges would make various learning contexts and types of learning more *viable, portable and impactful* (P2PU, 2014; p.5). Learners would be able to collect badges from different sources. Collection of badges could serve as digital resumes or portfolios. In this way badges would help to demonstrate a more complete picture of individual skills, competencies and achievements.

Following (P2PU, 2014), Mozilla released the first public beta version of the Open Badge Infrastructure in 2011 and later in 2012 a formalised Version 1.0, in this way establishing a technical, metadata-based standard for Open Badges (Casilli & Hickey, 2016). The first Open Badges were issued at the Peer 2 Peer University, in the online course *School of Webcraft* (https://courses.p2pu.org/en/schools/school-of-webcraft/) in 2011. Since the introduction in 2011, a number innovators worldwide have developed both technical solutions and educational programs focusing on issuing, earning and sharing open badges on the Web. In 2012, shortly after the release of Version 1.0, the Badges for Lifelong Learning competition (https://www.macfound.org/press/press-releases/badges-lifelong-learning-competition-winners-announced/) were founded by the MacArthur and Gates Foundation. This Digital Media and Learning (DML) competition attracted hundreds of submissions and founded over 30 innovative badge systems and 10 research studies between 2012 and 2013 (https://www.hastac.org/competition/digital-media-learning-competition-4). In this context, the first comprehensive research on design principles of Open Badges – Design Principles Documentation Project (DPD Project – http://dpdproject.info) – was carried out to document and study the practices developed in the DML competition winning projects (Hickey et al., 2014). The DPD research systematically analysed specific practices that emerged across 30

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projects and distinguished four sets of design principles for badge systems, i.e. (a) recognizing, (b) assessing, (c) motivating, and (d) studying learning.

In 2014 the Badge Alliance (http://www.badgealliance.org), an organisation coordinating use and implementation of open badges in diverse settings was founded with the aim of supporting a self-sustaining open badges ecosystem (Casilli & Hickey, 2016; p.123). The Badge Alliance is based on a model of working groups, which help individuals and organisations connect with others around specific points of interest, e.g. OB endorsement, OB standard, OB infrastructure, OB research, OB for higher education or OB for employment. Members of the Badge Alliance aim to foster and grow the OB ecosystem in a distributed and sustainable way. In 2015, the Badge Alliance started refining the OB technical specification to enhance its compatibility and interoperability. In 2015, the IMS Global (https://www.imsglobal.org/aboutims.html) – non-profit member organization that strives to enable the adoption and impact of innovative learning technology – announced an initiative to establish open badges as common currency for K-20 and corporate education (https://www.imsglobal.org/pressreleases/pr150421.html). Since 2015, IMS has partnered with Mozilla Foundation to accelerate adoption and interoperability of OB in the education and workforce sectors. The vision of the IMS Digital Credentialing initiative is to augment current IMS interoperability standards with the Open Badge standard and to explore new models of badge system design, storage, usage, and evaluation in the institutional context (IMS, 2015). Two digital credential projects initiated by IMS in 2015 are the *eT – extended Transcript* project making use of the Open Badges Standard and the *Digital Credentials Currency Framework* project augmenting the metadata embedded in badges by defining a structure that communicates value and aids consumer comparison (IMS, 2015).

In 2013, the Badge the World (http://www.badgetheworld.org) initiative began at Mozilla Festival in London (http://2013.mozillafestival.org), with the aim of documenting OB projects around the world. Badge the World provides an inventory of projects and helps like-minded organisations to connect and collaborate. The vision of the Badge the World website is to function as a place where those working with OB can learn about the work of others, discuss relevant issues with like-minded colleagues and find new collaborators to work with. Badge the World has been coordinated by Digitalme, a partner organisation in the Open Badge Network, supported by Nominet Trust, Mozilla, Badge Alliance and recently through the Erasmus+ funding in the Open Badge Network project. Currently there are about 200 Open Badges projects and initiatives pledged by users on the Badge the World website.

The above mentioned projects, research and initiatives paired with further development of the OB Infrastructure catalysed the growth of open badges with a number of initiatives sprouting across the globe. One of such initiatives is the Open Badge Network (OBN – http://www.openbadgenetwork.com), an Erasmus+ strategic partnership which brings together organisations from across Europe to support the development of the open badge ecosystem, promoting the use of open badges to recognise all forms of learning. The project was started in 2014 as Badge Europe and then renamed in 2015 to Open Badge Network to

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reflect the change in the constellation of the founding partner organisations and a shift in focus towards establishing a European network linked to the global community.

The Open Badge Network advocates the development of Open Badges in Europe on three levels – technical infrastructure, educational practice, and social movement. Below we describe these three perspectives and then illustrate how these are reflected in the vision, mission, activities and outcomes of the Open Badge Network.

Three Perspectives on Open Badges

Open Badges as an Open Infrastructure

Open Badges include development and deployment of the Open Badge Infrastructure (OBI), which is the underlying technology supporting badge issuing, collection, and display. The OBI is defined by two aspects: (a) the OB specification, which technically describes the OB standard, and (b) the Badge Backpack, which is a service that provides badge earners a way to collect and manage badges (http://openbadges.org/legal_faq/#open-badges).

The OB standard is documented in the Open Badges Technical Specification (https://openbadgespec.org). This specification defines the metadata that must be included in a badge for it to be considered OBI-compliant. Each Open Badge carries the information needed to understand that badge as it is transferred in the OB ecosystem. This information includes how the badge was earned, where it was earned, who earned it, if and when it expires, what criteria were used to issue the badge. The specification ensures that badges are interoperable with other open badges and Badge Backpacks. The current version of the specification V 1.1 published in 2015 includes term definitions for representations of data in JSON-LD (v1.1) (https://openbadgespec.org/v1/context.json). The OB specification is made up of three types of core Badge Objects: Assertions, BadgeClasses, and Issuers. The 1.1 version also introduces Extensions as a means for issuers to add additional metadata to Badge Objects (https://openbadgespec.org/#Extensions). The OB metadata specification is available under an open license – the W3C Community Contributor License Agreement (CLA). The Badge Backpack is a repository for collecting and displaying badges from a variety of sources. It is a user management interface where the earner can import and delete badges, set privacy controls, create and publish collections of badges. The Mozilla Badge Backpack (https://backpack.openbadges.org) is a Mozilla hosted service that uses Mozilla's authentication platform called Mozilla Persona to tie badges to a specific user. Badges are earned on issuer sites and can be added by the earner to a Badge Backpack by accepting the badge and pushing it into their Backpack. Pushing badges to the Backpack means adding individual badges the larger OB ecosystem. Once in a Backpack, a badge may remain private or may be made publicly available on the Web. While Mozilla is hosting a reference Backpack – the Mozilla Badge Backpack – further backpacks can be hosted by different entities, enabling a federated model of providers.

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Open Badges as Open Education

Open Education (OE) has been inspired by the open source software movement and as such has promoted the use of the Internet and the Word Wide Web to free knowledge, use and reuse of resources, link ideas, enhance worldwide collaboration and also "receive credit and kudos for contributing to education and research" (Baraniuk, 2013; p.229). Open Badges go beyond the technical infrastructure and are also used as a term to describe educational practices. In fact, these practices can be framed as Open Educational Practices (OEP). The traditional understanding of OEP focuses on the educational practices related to Open Educational Resources (OER). The International Council for Open and Distance Education (ICODE – http://www.icde.org) defined OEP as "practices which support the production, use and reuse of high quality open educational resources (OER) through institutional policies, which promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path". This understanding of OEP, however, does not take other elements of open educational into account. In order to be inclusive, the author proposes the following, wider definition of OEP:

> *"Open Educational Practices are practises which support and promote the use open resources and systems combined with innovative pedagogical models to empower learners as co-producers of their self-directed, interest-driven lifelong learning paths."*

Based on a comparative literature review, Buchem (upcoming) analysed how Open Badges have been conceptualised in current publications. The emerging key conceptualisations of open badges are *Open Badges as Pathways*, *Open Badges as Bridges* and *Open Badges as Catalysts*. These concepts are closely linked to Open Education. The concept of *Open Badges as Pathways* emphasises the potentials of OB to document and visualise individual learning pathways over time. Casilli (2013) describes badge pathways as a way to visualise the learning journey. The value of digital badges in this context is defined not by experts (e.g. teachers) but by learners themselves. Open badges enable learners "to connect the outlying dots that constitute lifelong learning" (Casilli, 2013). Grant (2014) also points out that badges enable creating lifelong learning pathways by reflecting flexible and modular types of curricular design across multiple organizations. The concept of *Open Badges as Bridges* emphasises the potential of OB to enhance and bring together learning in and from different contexts, including formal, non-formal and informal learning contexts. The potential of OB has been seen in encouraging connections between in- and out-of-school learning, bridging differences in opportunities for learning, improving school-community partnerships and making information about student learning available to formal and informal education providers (Mozilla, 2013). The value of badges has been especially seen in connecting learning across contexts by making different learning context and different types of learning more significant and viable (Knight & Casilli, 2012). Finally, the concept of *Open Badges as Catalysts* emphasises the role of OB as catalysts for discussions about learning and for a change in educational practice, especially towards a learner-centred and learner-driven approach to learning as well as towards a more integrative educational approach. For example, Wyles

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(2013) describes OB as a catalyst for a new learning design. Goligoski (2012) sees OB as a catalyst for legitimising informal learning experiences, particularly in view of gaining jobs, community recognition and learning opportunities. Charleer et al. (2013) show how OB can serve as a catalyst for discussion using a badge board in class to stimulate and moderate discussions and a deeper reflection about learning. Finkenstein, Knight and Manning (2013) argue for OB as a catalyst for interdisciplinary explorations, discussions and collaborations.

These three conceptualisations of open badges help to frame an extended version of Open Educational Practices by emphasising supporting learners in creating own learning pathways, bridging learning contexts and bringing together learning from different settings as well as catalysing change in educational practice and learning design. The understanding of Open Badges as an Open Educational Practice also corresponds to the Connected Learning initiative supported by the MacArthur Digital Media and Learning Initiative. The Connected Learning Initiative emphasises interest-driven, openly networked and shared educational and learning practices (Ito et al., 2013). The Connected Learning model focuses on supports and mechanisms for building environments that connect learning across the spheres of interests, peer culture and academic life (Ito et al., 2013), and as such provides a valuable framework for a broader conceptualisation of Open Educational Practices.

Open Badges as an Open Movement

Open Badges can be also viewed as an open movement inspired by the open source communities. The open movement begun with free software and open source in the mid 1980s and can be linked to the "philosophical foundations of modern education with its commitments to freedom, citizenship, knowledge for all, social progress and individual transformation" (Peters & Britez, 2008). The OECD (2007) report points out that the open source software movement focusing on *sharing software programs*, and the open access movement focusing on *sharing research results* have been followed by the open educational resources movement which focuses on *sharing learning resources*. However, the movements promoting opening of research and education have been recently complemented by the open badges movement focusing on *sharing learning outcomes*. Following Peters and Britez (2008) in saying that open education and education for openness are one of the most significant educational movements in the 21st century, and taking into account that the open source software movement is one of the most significant approaches to software development and intellectual property in the 21st century (Warger, 2002), the open badges movement can be considered as a movement at the intersection of both open source and open education movements. By combining both spheres, open badges help to realise the potential of the Web for learning – creating an extended, connected learning environment focused on transparency and creating opportunities for creating, sharing, recognising and distribution of learning outcomes.

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Open Badge Network

The Open Badge Network advocates the development of Open Badges in Europe on three levels, i.e. (a) open infrastructure, (b) open education, and (c) open movement. These three perspectives are reflected in the vision, mission, activities and outcomes of the Open Badge Network (OBN) as outlines below.

The *vision* of the Open Badge Network is to build and cultivate a self-sustainable network of various Open Badges stakeholder groups in Europe at the same time linking European innovators, projects and initiatives to the global OB community. The Open Badge Network recognises the need for regional associations of stakeholders sharing similar educational and employment contexts, especially credentialing practices and approaches to recognising qualifications and competencies. For example, in Europe the credentialing system in higher education has been determined by the Bologna process and the European Credit Transfer System (ECTS – http://ec.europa.eu/education/ects/ects_en.htm). Similarly, credentialing in the vocational education and training has been by the European Credit System for Vocational Education and Training (ECVET – http://www.ecvet-team.eu/en). These and other European credit systems frame the discourse around transfer, recognition and accumulation of individual learning outcomes in Europe. In order to enhance the uptake of Open Badges in Europe it is necessary to refer to these systems, look for connections and define delineations. Regional credentialing practices as is the case of Europe substantiate the need for initiatives such as the Open Badge Network.

The *mission* of the Open Badge Network is to provide a trusted source of independent information, tools and informed practice to support people who are interested in creating, issuing and earning badges across Europe. The project partners and associate partners of the Open Badge Network drafted a common Charter, which includes the key principles for promoting and establishing Open Badges in the European context. These principles include (a) advocate the adoption of Mozilla Open Badge standard across Europe to recognise learning achievements gained in variety of contexts, (b) provide information, guidelines and use cases to enable the widest possible adoption of Open Badges across policy, education, employers, service providers and individuals, (c) advocate for and enable social inclusion by ensuring marginalised groups are able to gain recognition for all their skills and achievements, supporting their personal and professional progression, (d) raise the value and profile of informal and non-formal learning taking place outside of formal education, (e) support on-going development of Mozilla's open source backpack and other open badging tools, to ensure end users' data is portable between systems and retained by the individual. All partners of the Open Badge Network are encouraged to agree, support and advocate the OBN Charter expressing its mission.

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The *activities* and *outcomes* of the Open Badge Network are organised around seven output areas addressing specific challenges of establishing Open Badges in Europe (http://www.openbadgenetwork.com/outputs/):

- Activities and outcomes related to the promotion of OB as an *open infrastructure* are embedded in two outputs, i.e. *Open Badge Infrastructure* and *European Open Badge Network*. The infrastructure output focuses on the elicitation and collection of use cases, describing a specification for the European OB infrastructure, and designing a prototype of a European competency repository with the aim of sharing competency descriptions to complement the creation and sharing of badges. The network output focuses on the provision of the infrastructure, services and resources needed to support the construction of the European Open Badges community.
- Activities and outputs related to the promotion of OB as *open education* are embedded in three outputs, i.e. *OB for Individuals and Organisations*, *OB in Territories* and *OB Policy*. The first two outputs investigate the use of OB from the perspective of individuals, organisations and territories, also producing guidelines for implementation and testing these guidelines in pilot case studies. The third output focuses on enhancing awareness for Open Badges among policy makers and eliciting policy recommendations for promoting OB in Europe.
- Activities and outputs related to the promotion of OB as *open movement* are embedded in two outputs, i.e. *OB Framework and Leadership* and *Research, Evaluation and Quality*. While the first output is dedicated to designing self-/sustainability of the OB Network and promoting the OB movement in Europe, the second output focuses on the quality aspects of OB, with focus on the European context. Both outputs aim at promoting a cross-stakeholder discussion about open badges and eliciting recommendations for issuers, earners and users of open badges in Europe.

Recommendations for establishing Open Badges in Europe

The Open Badge Network members believe that Open Badges can enrich and expand Open Educational Practices. A growing body of evidence suggest that more and more learning is taking place outside of formal education in digital settings. Especially digital opportunities are used by learners to engage in self-directed and interest-driven learning. Open badges can streamline and recognise such learning in effective and innovative ways. In order to mainstream Open Badges in Europe reflecting the unique educational and employment local contexts, the Open Badge Network recommends stakeholder working with open badges in Europe to (a) examine the unique educational and occupational potentials for issues and earners in context of specific projects and initiatives, (b) apply open badges to facilitate and recognise learning, enhance employment opportunities and build new communities of practice, (c) provide information and guidance on how open badges can benefit individuals,

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organisations and territories. The Open Badge Network invites all interested stakeholders to join the common effort of promoting and establishing Open Badges in Europe.

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THE CHANGING NATURE OF COURSE "AUTHORSHIP" IN ONLINE HIGHER EDUCATION

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In the late 90s, what might now be described as the "early days" of online higher education, 56.6 kbps modems were just starting to appear in homes, online enrolment was a fraction of what it is today, the push to grow online learning was largely faculty-led, and few university strategic plans included more than a passing reference to online education.

In 2016, of course, education professionals in North America have become accustomed to reading breathless editorials in mass-market publications like the New York Times about the disruptive power of online learning. University Presidents tell us that online education is a "game changer". Public intellectuals like Clay Shirky explain that technology is bringing an end to business as usual for higher education, just as it has for newspapers and the music industry. Much has changed.

In the midst of all this talk of upheaval, one aspect of online higher education has remained virtually unchanged: the way that traditional colleges and universities go about designing, creating, and financing in-house online course development.

Now, as in the late 90s, individual instructors assume the bulk of the responsibility for course design and development. Support is now often available from an instructional designer and technical staff, but their impact is limited by workplace conventions that encourage faculty to work alone (and staff to let them). Funds for course development are similarly constrained, due to the conventional notion/practice that course materials should be built for use only within the institution from which they came.

The impact of these practices on the potential for high quality instructional content can't be overstated. The development of more sophisticated forms of digital learning such as personalized instruction driven by analytics, immersive gaming, or the use of rich media, to name but a few possibilities, almost always require a team of specialists, longer development schedules, and considerably more funding than is available in the current approach. Placing the burden on lone educators with minuscule (or non-existent) funding and who are not hired for their strengths in instructional media development is neither logical, nor fair. But more to the point, it's a lost opportunity to leverage high-quality course design to drive improvements in learning outcomes.

As a result, students across North America are frequently presented with online courses consisting of repurposed classroom PowerPoint slides, home-made graphics, and an incoherent pastiche of free content from the Net – each element developed for different purposes and pitched at different levels. Worst of all, these online learning experiences are being developed without deep knowledge of the science of how people actually learn most effectively – knowledge, ironically, that universities themselves have generated.

Drivers of Change to Authoring and Content Quality

In 2016, though, a number of factors are converging that appear set to reconfigure the role and status of high-quality instructional content and, consequently, the activities involved in course authoring and content acquisition. The more pertinent factors include:

Quality Course Design and Competitive Differentiation

The number of online and blended courses continues produced by North American institutions continues to climb rapidly. Real choice for online students leads to real competition between institutions. And competition requires differentiation. Increasing the instructional quality and production value of online course content is a relatively obvious and tangible means of responding to the demands of competition.

Beyond Instructionally Agnostic Software

For much of online higher education's short history, educational software has been used primarily as merely as a cost effective means of distributing repurposed classroom materials. But new, more advanced forms of instructional software and content are finally emerging which have instructional strategies built into them. These applications have the capacity to improve and scale effective instructional practices, helping educators do more with limited resources – such as providing each student with personalized feedback on their progress.

Increased Transparency

The Internet is making it easier for instructional materials – normally kept out of reach behind password-protected sites – to be available to people outside the institution. The most obvious example of this trend is OER (open educational resources) and its' offspring, MOOCs. The trend puts a core activity of the institution – its teaching and teachers – on display in unprecedented ways, opening up the institution and its personnel to evaluation and direct comparison with other institutions. Competition between institutions will continue to materialize as more content and activity becomes publicly available.

Consumer-education apps crossover

Educators are turning to consumer applications, such as Facebook, WordPress, and others to deliver their online courses. The quality, functionality, and ease of use of these applications, will set new standards for content that will be difficult to meet through in-house efforts in universities.

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Media Company Investment in Edtech

There is growing interest in digital higher education among traditional media companies, including News Corp. (Amplify), New York Times (The Learning Network), The Washington Post (Kaplan Inc.), Bertelsmann AG (Brandman University), and Condé Nast (Condé Nast College of Fashion and Design). While many in education bristle at this trend, these corporations bring deep experience in packaging and delivering information-related products with high quality design that will further raise the bar for quality in instructional quality.

Rising Use of Apps

The share of internet traffic handled by native applications – particularly in mobile devices – continues to grow faster than browser-based traffic. Due in part to the superior user experience afforded by applications.

These six factors are serving to raise the bar for instructional content in online higher education. Colleges and universities are responding, albeit slowly, by relying more heavily on packaged content solutions and directing more funds to in-house content development processes and resources.

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CREATING A SOCIALLY SENSITIVE LEARNING ENVIRONMENT FOR SCIENCE EDUCATION: THE SSIBL FRAMEWORK

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Promoting Attainment of Responsible Research and Innovation in Science Education (acronym: PARRISE, an EU project for 2014-2017, http://www.parrise.eu/) has been developing and testing an integrated framework for Socio-Scientific Inquiry-Based Learning (SSIBL) based on the four components: Responsible Research and Innovation (RRI), Socio-scientific Issues (SSI), Citizenship Education (CE) and Inquiry Based Science Education (IBSE), this last being its core element. Adopting this model for science education is important because the relationship of scientific discoveries and innovations and related social issues are rarely indicated in curricula based on knowledge transmission. In an age of intense citizen involvement in government decisions about the preservation of natural environment or regulation of energy consumption, communicating socially sensitive issues through science education is increasingly important – and also motivating for students who thus experience the direct relevance of scientific knowledge for everyday life. Our project team works on creating a science education environment that encourages computer-supported, integrative approaches for a multifaceted, interactive and social issue-based approach. Technology is used to increase the collaborative aspects of learning, prepare science teachers to act as responsible citizens of a social-networked society and educate students who are able and also motivated to enter public debates about the way scientific discoveries are used or abused. This paper introduces the SSIBL model as integrated in secondary school Physics education. A *formal secondary school learning environment* is proposed that includes real life experiments documented and evaluated through computer assisted devices, and *a variety of informal and non-formal environments* (in science centres, visitor centres of scientific research institutions and technological companies) are integrated to offer hands-on experiences through simulations and mock-ups of research and development tools and supported by an *in-service learning environment* for teachers. The development of educational programs to teach about *New Physics* often involves debates to clarify different citizen, researcher and political standpoints. The case study on the use of nuclear energy presented here will indicate how these three technology-rich learning environments interact.

The Socio-Scientific Inquiry-Based Learning (SSIBL) Framework

Science is primarily been taught in Hungarian schools as a knowledge system separate from its relationship with values and social justice, in which deduction is used to apply theoretical knowledge to solve problems. The majority of European public does not feel informed about the developments in science and technology, although at least half of European citizens are interested in these issues. In a 2013 Eurobarometer survey, 59% of respondents told that they had read articles and 47% talked to friends about recent results of scientific research in printed press or on the internet. Civic activities related to issues of social relevance were, however, rather limited: only 13% signed petitions or joined street demonstration, 10% attended public debates about scientific issues of social relevance. Hungary is among those countries whose citizens claim not to be adequately informed about developments in science and technology (Special Eurobarometer, 2013). The *Promoting Attainment of Responsible Research and Innovation in Science Education* (PARRISE) Project believes that science is intrinsically social and its products and processes are mediated through power relations (Roth & Calabrese Barton, 2004). Science education needs to address issues of social relevance and encourage students to become responsible adults, able and willing to influence political decisions influenced by scientific research. This paper describes a pedagogical model and an instructional experiment to address this issue.

Socio-Scientific Inquiry-Based Learning (SSIBL) connects three pedagogical concepts with Responsible Research and Innovation (RRI): Inquiry-based Science Education (IBSE), Socio-scientific Issues (SSI), and Citizenship Education. (Nedelec et al., 2015) The connections between these components are represented on the figure below.

Figure 16. The Socio-Scientific Inquiry-Based Learning (SSIBL)

Responsible Research and Innovation (RRI)

Recognising that technological developments, inspired by research and innovation, both have an impact on, and are influenced by, social values and social change, three underpinning features of RRI are highlighted in this framework (Owen et al., 2012). Science for society focuses on public values and social justice, i.e. normative motivations; science with society dialogue and deliberation between the main actors, i.e. substantive motivations; and the coupling of research and innovation with responsibility as a recognition of the uncertainties and risks associated with the development of any technology and how these might be

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anticipated and managed. Science for Society and Science with Society are therefore critical aspects of Citizenship Education integral to RRI.

Inquiry Based Science Education (IBSE)

"Inquiry is the intentional process of diagnosing problems, critiquing experiments and distinguishing alternatives, planning investigations, researching conjectures, searching for information, constructing models, debating with peers and forming coherent arguments" (Linn et al., 2004 as cited in Rocard et al., 2007). To support scientific literacy – also in terms of its social applications – the need for responsible involvement of citizens at all stages of the research and development (R&D) process has received greater emphasis. A significant educational impetus has been IBSE, as outlined for example in the Rocard report (2007), which has implications for new teaching approaches and new curricular alignments (Gray, 2012).

Socio-scientific Issues (SSI)

Ryder's (2001) review of the role of socio-scientific issues and its relations to curricular science suggests that school science often has to be recontextualised and transformed to make it amenable to acting on SSIs (Layton et al., 1993). A common objection is that socio-scientific problems are too complex for school study, where the problems are often discussed in a simplified manner or the science used is one that is beyond the remit of the school (Dawson, 2000). Although socio-scientific reasoning skills (SSRs) have been proposed for arriving at rational solutions to SSIs, there is little evidence that such skills can be generalised (Sadler et al, 2011).

Citizenship Education (CE): Science for Society and Science with Society are therefore aspects of critical Citizenship Education which are integral to RRI

Science with society is participative, acknowledging that those affected by the technology, as well as scientists, are involved both at the upstream stage (that is when the scientific ideas are initiated and possible consequences anticipated) as well as downstream at the point of production, application and distribution. This assumes a knowledge and understanding of the underlying science, as well as a critical appreciation of the process of the research. Participative R&D is therefore a multi-agency approach to research and innovation because knowledge is differentiated and distributed in form (i.e. from academic knowledge including different disciplines, professional knowledge, and knowledge-for-living). Hence these foreshadow interactions between formal (curricular) and informal (non-curricular) knowledges.

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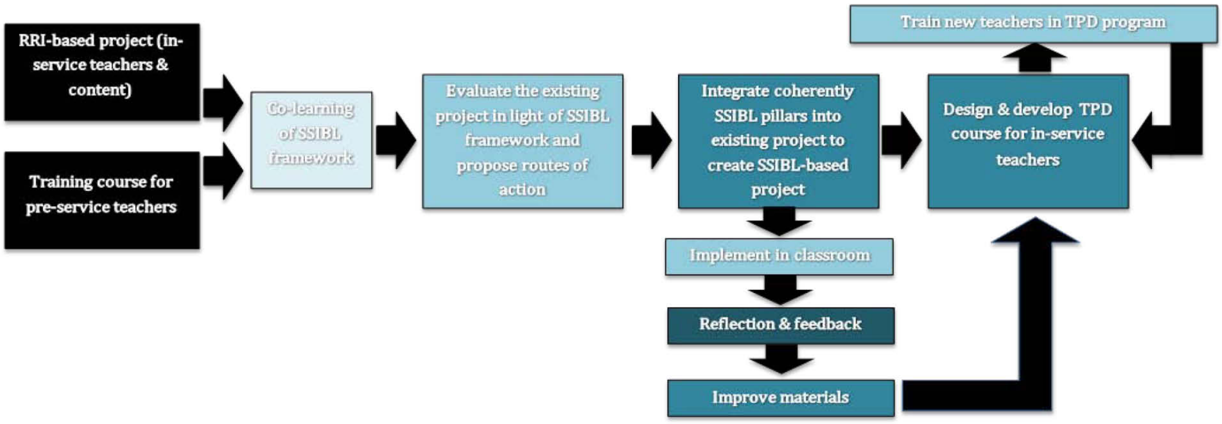

Figure 17. Model for the Hungarian in-service teacher training program based on the SSIBL Framework

The four pillars of the framework are employed in a Hungarian teacher training course for secondary school teachers on innovative methods for teaching Physics. The course also provides a scientific background on current research results as well as social issues related to their application.

Learning Environment Design

Hungarian designers of a new learning environment to support the integration of social issues in science education must take into consideration that science teachers in this country are *reluctant to employ ICTs tools as they consider real-life experiments a core constituent for authentic teaching and learning of their discipline*. The tension between human and machine approaches to learning has, however, been reduced in recent years. According to the OECD study on educational innovation, more direct observation of scientific processes and description of phenomena by students in secondary school science lessons is detected, and these hands-on activities are often supported by ICTs. The use of computers resources for primary and secondary science education instruction significantly increased in Hungary. "Between 2003 and 2011, Hungary saw a difference of 18% points in the proportion of 4th grade students using computers to practice skills and procedures in their science classes; the change in this metric for 8th grade science students was 24% points over the same period" (OECD, 2012; p.4).

School computerisation has also taken new momentum with massive government purchases of notebooks and laptops in the first decade of the 21st century, and the slow but steady increase in the use of mobile devices in the second decade. Bring your own device (BYOD) initiatives and large storage space through cloud computing offered free of charge for schools and teachers have been supporting the proliferation of ICTs in education and create a more favourable context for technology-rich environment design in Hungary (European Schoolnet, 2013). Social inclusion and the creation of a learning environment that supports students with special needs is another important design issue to consider. "Broadening the horizon of science teaching and learning in Hungary aims to focus on creating an inclusive learning environment, hence increasing accessibility, parity and equity in science education, going

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beyond self-evident excellence in Hungary" is the aim of a socially focused research project, the results of which we also considered (AMGEN, 2015).

In order to combine scalability with personalisation, and provide a learning environment for the social contextualisation of science education, the Hungarian PARRISE team adopted educational directions for design. We agreed that experiments had to be demonstrated first and foremost in a real-life context in science laboratories of schools. ICTs were supposed to be used as a supplement for documentation and measurement. Simulation and modelling of processes were only utilised for experiments that are impossible or too expensive/time consuming to demonstrate. Social computing was constantly employed for sharing ideas and observations as well as catalysing discussions.

When developing a new learning environment – merging formal, non-formal and informal spaces – we had to consider the present situation that influences the attitudes of teachers about innovation. Teachers need to be informed about current results of science in an authentic manner, preferably from the researchers themselves. When innovating, teachers are more inclined to assume the role model of Physics researchers than educational researchers. The teacher professional development (TPD) programs should demonstrate a pedagogy that facilitates the translation of current science issues into educational content. Student performance in science surveys keeps declining while best students still excel at Olympics. Apparently, education targets high performers and transmits basic knowledge necessary to embark on a science career.

The PARRISE team collects good practice examples and builds transnational, multidisciplinary communities of science teachers, teacher trainers, science communicators, curriculum developers and citizenship education experts to implement the SSIBL Framework. In-service training events provide a methodological repertoire for the realisation of inquiry based and social issue focused science education. Teachers are empowered to act in one or several of the following roles: learner, teacher, developer, and researcher. In Hungary, teachers' professional development is regulated by a government act that requires the renewal of teaching skills and abilities every seven years through participating in training courses with a total of 120 credit points. The offerings for science teachers focus mainly on methodological innovation: the *modernisation of teaching*. However, the other aspect of pedagogical practice: *education of critical and responsible citizens* seems to be ignored or tackled as an *inferior* "add-on".

As members of the PARRISE community, we intend to create a networked system of learners who developed active, collaborative agency around shared knowledge objects (Hakkarainen et al., 2004), who worked and learnt together towards common goals such as investigating a socially sensitive scientific domain. Community driven inquiry learning based on progressive inquiry and collaboration was especially suitable for involving students in disputed, social issues related to science (Venturini, 2012). We have selected the following *pedagogical and learning characteristics* to develop during our course:

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- An ability to distinguish between scientific, social and ethical propositions;
- Understanding the basics of Responsible Research and Innovation (RRI): to internalise how scientific principles can be transformed and operationalized in social and ethical contexts;
- Introduction of dialogue, reasoned discussion and argumentation in science education;
- A recognition of the social and political context in which decisions arising from Socio-scientific Issues (SSI) are made;
- Development of an educational repertoire for negotiating SSIs in relation to the evidence available, the personal, political and social consequences of decisions based on research results, and the extent to which any issue divides sectors in society.

Being a teacher of responsible citizens of the future who would be able to dispute political action related to scientific discoveries and their applications requires a twofold set of competences. First, teachers need to possess the social sensitivity and strategies of action they are required to educate for. Second, they need a profound knowledge of results of current research related to focal points of school curricula in order to identify socially sensitive issues and develop teaching strategies to introduce them at school. To identify these issues, the theoretical framework of *Responsible Research and Innovation* (RRI) is being used. In Hungary, the attitude change from *research for society* to *research with society* is especially important as it emphasizes a more and more intense public demand of democratisation of education.

The current course is structured to enhance both capacities. Through presentations and experience-based workshops, teachers will be made aware of current research in Physics in areas closely related to the teaching material they are supposed to cover. This component develops a knowledge base required for authentic teaching as well as the identification of topics discussed in the media with more or less scientific grounding. Through the second component of the course, the model of *Socio-scientific Issues* (SSI) will be introduced. Physics teachers will be empowered to raise these issues in formal and informal education and develop critical citizenship skills of their students with a firm grounding in responsible research and innovation. Good practice examples of international SSIBL teams and Hungarian projects that qualify as SSIBL practice will be showcased during this phase, and Hungarian adaptation options considered.

An international conference was organized in August of 2015 on "Teaching Physics Innovatively (TPI-15) – New Learning Environments and Methods in Physics Education" (http://parrise.elte.hu) with the following purposes: to supplement the TPD with a workshop, a panel discussion and an informal learning event; to collect ideas about the further improvement of the TPD from international and Hungarian experts; and to develop international connections on teaching physics through ICT supported formal and informal teaching methods. More than half of the participants of the conference were Hungarian in-

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service physics teachers or teacher trainers. The major objective of the conference was to collect good practice methods on IBSE in physics education, and the keynote speakers were encouraged to focus on socio-scientific issues in physics.

Teaching Methodology

We developed a knowledge community of teachers supported by resources shared through digital technology (the Moodle e-learning environment and Web 2.0. resources like science blogs and interactive science portals. The introduction of digital resources in the training program was justified by research on changes of science media consumption. The technological paradigm shift accompanied by changing user preferences resulted in rising digital news consumption and decline in print media subscriptions, even among adults aged 40 and more (Jenkins, 2004). Students as well as teachers like to collaborate with their peers and they prefer using online learning environments, like blogs, that can motivate them to take active part of discussions (Salovaara-Moring, 2012). Mentoring in closed online learning environments where teachers socialise and learn using integrated social web applications to share and discuss their learning experiences provides an excellent mentoring space for transmitting innovative educational practices (Kárpáti & Dorner, 2012).

Our TPD method takes place into four steps: presentation of the theoretical elements and the logic of the SSIBL framework; offering ICTs supported tools and methods to teachers; mentoring teachers while co-constructing an SSIBL scenario (implementation); debriefing and reflections. These four steps include several roles for the students. At first, they are learners understanding the theoretical framework of SSIBL and its relevance for the Hungarian educational and social context. In the second and the third roles, they are developers implementing the SSIBL process. In the last role, act as researchers trying in a collaborative process to add to the framework what the practice has revealed.

The course has a modular structure. Compulsory and elective modules cover current issues in Physics and their pedagogical "translation". The method of delivery is interactive, all presentations are followed by interactions: discussion and series of experiments. Home assignments include reports on educational practice, self-designed experiments and teaching aids (mostly digital). Performance evaluation at the end of the course involves tests and oral examinations as well as the assessment of the home assignment. Socio-scientific issues in the Physics TPD that are used to implement the SSIBL framework: philosophical aspects of "Big Bang"; creation *theories* in contemporary Hungarian society and their educational implications; The *Butterfly Effect*: naïve beliefs and scientific explanations of cause-and-effect processes; chaotic dynamics in science and society; history of popular assumptions about the structure of the Solar System; nuclear energy: pros and cons in scientific context.

The last theme will be used here as an example for the use of the SSIBL Framework in a complex, technology-rich environment for Physics education: *educational communication of the use of nuclear energy* – the most controversial socio-scientific issue in contemporary Hungary, one that divides the Hungarian public as well as the research community. The

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media seems to favour renewable energy contained through solar plants or bioenergy providers – solutions that many researchers consider less effective and more expensive than power plants. According to the SSIBL Framework, this issue was presented through a series of formal and informal learning experiences during a TPD course.

1. *Socio-epistemological inquiry and cartography of controversies* to identify different types of uncertainties linked responsible research and innovation: collection of resources and sharing them through the virtual learning environment and social media applications;
2. *Presentation of current research* on the use of nuclear energy in power plants – lectures and special presentations during the conference *Teaching Physics Innovatively* (TPI-15), organised at ELTE University, Faculty of Science in August 2015, an informal learning component of the TPD course;
3. *Debate method* used to elicit professional and epistemological risks felt by teachers with these new practices, positions of the teachers about these risks: roundtable session at the TPI-15 Conference;
4. *Demonstration of educational methods* integrating the use of real objects, models and simulations in the Visitor Centre of the Paks Nuclear Power Plant, another informal learning component of the TPD course. Modalities of interactions and goals of them within the classroom, argumentation, socio-scientific reasoning and action were presented and discussed with explainers of the informal learning environment of an integrated space including elements of a technology museum and science centre;
5. *Designing classroom activities* by teachers based on their experiences during their training process involving inquiry, presentation and demonstration.

The participants of the in-service training course demonstrated different viewpoints about nuclear energy that may or may not have been changed during their activities in this complex, technology-rich and innovative learning environment. In any case, they acquired a methodology to present controversial socio-scientific issues in education through a methodology that is research-based and interactively designed to catalyse different opinions and channel them towards a sophisticated, scientific argumentation. Participants were expected to deliver a pedagogical essay and suggest e-learning materials and applications on strategies of teaching about the four main subject area of the course: modern physics, microphysics, astronomy, and chaotic dynamics. These essays utilised the SSIBL framework and reflected on social implications of science. Some teachers embarked on learning tool design and created ICTs-supported solutions to enhance the interactive nature of their teaching. All participants learned that developing socially responsible citizens is a major responsibility of science education.

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GLOBAL CITIZENSHIP AND LEADERSHIP IN CHANGED LEARNING ENVIRONMENTS

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The Impact of globalization on work and learning

One of the key characteristics of the global economy is the increasing fragmentation of production into different activities and tasks along global supply chains. This has profound socio-economic impacts (ILO, 2015). The rise in global supply chains has been facilitated by a significant reduction in trade and transport costs and by advances in information and communication technology (ICT). Together, these forces have transformed the world into an interconnected and multipolar production and trading arena. This makes obsolete traditional national boundaries and limits. Physical distance is no longer such an obstacle to the movement of goods, services and information. Consequently, the way in which the world economy is structured has dramatically shifted. This brings new types of benefits and risks - with differing implications for firms, workers and learners in both advanced and emerging economies. With an ever-greater number of direct and indirect supply relationships between firms, global supply chains have become increasingly complex (Meixell & Gargeya, 2005).

There are two immediate impacts. One is that all labour market activities now must be viewed in contexts of internationalization. Second is that jobs themselves have been transformed from the defined certainties they once were. Patterns of employment have changed. Even if an individual remains with the same employer over an extended period of time, that person's job requirements will transition many times over the course of time in that position. It is almost certain that the company itself will transition to different owners, that supervisory or production models will evolve and that shifts in the employers' desired outcomes shall be assured. The traditional demarcations within jobs and between sectors have blurred significantly. The capacities and skills required have altered. New forms of work and work organization have produced radically new forms of work production, behaviour, methods, and settings. The evidence is that this pattern is accelerating.

The overall gains from this process should outweigh adjustment costs and any income losses, thereby entailing net economic benefits. The *distribution* of these net benefits, however, depends heavily on policies, legal frameworks and institutions. While globalization can create and destroy jobs when parts of the production are shifted across countries, it can also affect different aspects of job quality (wages, working conditions, specifications, contracts). In other words, economic benefits do not automatically translate into beneficial improvements for employees at all times. But the jobs people now do assume an innovative character unrelated to traditional models.

Globalized engagement can affect highly skilled and low-skilled workers differently. Apart from many other things, this can have an effect in shaping income distribution. Globalization often breaks up the production process so that more knowledge-intensive tasks remain concentrated in the lead firm, while less knowledge-intensive tasks are outsourced to suppliers in other countries. Globalization thus changes the demand for skills in both lead and supplier firms. These changes in demand then have an impact on the wages of high- and low-skilled workers (as well as the ratio between the two). In this respect, globalization affects workers differently based on their skill endowment (Feenstra & Hanson, 1995).

This has huge implications for the provision of relevant education and vocational training programs. The impact of ICT supported delivery systems has only made more intense the need to match changing needs to relevant, timely and sustainable educational models that interact positively with this changing world. Upgrading towards technologically and skill-intensive jobs may be the preferred option in the long run to address skills gaps and the impact of vocational change and transformation. But whether or not this is feasible will depend on the productive capacity of an economy. In this respect, policies to enhance technological capabilities, technology transfer and the development of skills, including on-the-job training, are essential (ILO, 2015). This in itself challenges traditional models of learning and educational provision.

Educational responses to an altered world

This has immediate and profound implications for those working in educational provision, both locally and globally. Traditional jobs have been re-designed into areas of work performance, which are variable, multidimensional and mutating. Flexibility and adaptability are now more important than specified functional capacities. In addition, the nature and structure of work organization has altered significantly. Concepts like a *job for life*, security, role demarcations, unionization, social security, or tenure have been discarded. They have been replaced by new environments where change, flexibility (in how, when, and where work is done), interaction with co-workers, re-location, disruptive innovation, pervasive technologies and insecurity are now the new norms. As if this were not enough, companies that operate globally shift locations and production lines across continents with staggering rapidity and operate in an environment where job autonomy no longer has any meaning.

For learners (and especially those at risk of social marginalization), and those professionals who work with them, there is now an urgent need to re-conceptualize the environments in which individuals work and learn. This means not only a profound re-examination of the nature and scale of employment and work in the globalized 21st century, but also an ability to understand the dynamics of globalization – and the competence to advise, assess and undertake learning in a deeply transformed environment.

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The impact on education and learning of the globalization process is equally contradictory. On the one hand, learning resources (such as course materials, accepted terminology, subject range and internet-based learning) have been criticized for being overwhelmingly centred on US or European models and norms – and, in particular, by being dominated by exclusively English language orientations. On the other, globalization opens up real possibilities for transformative learning, where knowledge exponentially grows without constraints of national curricula or vested self-interest. New models of learning, as well as recognition if not transformation of educational platforms and certification, beckon as industry and education develop more globally meaningful collaborations.

The role of advanced technological tools and e-learning has also become a key focus in the literature and research undertaken internationally. The use of advanced technologies powerfully reinforces learning for adults and provides a rich resource in terms of techniques and methodologies for teaching staff and facilitators. Among the new professions that have emerged are digital content designers, digital writers, graphic artists, rich media experts and project managers for digital content. Parallel to this macro-economic context is the growing impact of the emerging digital world and the contours of employment it is shaping. This new, emerging digital world has created a range of new professions and skill-sets, which are literally and figuratively unprecedented. In other words, these new professions cannot be studied in advance. But they represent a range of professional skills, behaviours and attitudes that professionals are obliged to learn in a hands on manner, in dynamic and evolving job configurations.

Whatever the concerns, it is clear that globalized processes are now a permanent part of the fabric of twenty-first century life. This poses a lot of questions for the principles and practices that underlie the science and practice of learning.

Inclusive global citizenship

It has been found that though the new policy contexts of various European countries support a shift to inclusion (inspired by the policy framework objectives of the European Union), education professionals need more support to develop their practice. It is also possible to conclude that there are some signs of hope and that inclusion can be fostered in settings that have flexible curriculums, programs for staff exchange/training, spaces for dialogue, addressing issues of human rights and fostering processes of labour market participation and practices of peer/mentoring support for stakeholders and professionals. The profound transformation in the global labour market offers both challenges and opportunities.

As work environments change and recognition grows that transition to global existence started long ago, there are exciting challenges to expand our understanding of the world, of the closeness of people and places we have hitherto regarded as totally disconnected from our realities. As the world becomes flatter, both opportunities and risks emerge. On the one hand, the scale of economic disruption is reflected in wars, genocide, ethnic cleansing, health issues and above all the extraordinary movements of people either as economic migrants of refugees

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– now a permanent and accelerating dimension of globalized life. On the other, the explosion of instantaneous communications, accessible education, networked collaborative social media and increasing awareness of how (and why) others live as they do is producing a renaissance in learning and expression.

Cohen and Kennedy (2000) cite six issues around globalization that impact directly on education and learning:

- Changing concepts of space and time;
- An increasing number of cultural interactions;
- Common problems facing the world's inhabitants;
- Growing interconnections and interdependence;
- Networks of increasingly powerful transnational actors and organization;
- Synchronization of all dimensions involved in globalization.

The removal of barriers to participation and the enhancement of embedded equality approaches will, at the end of the day, be about asserting strategic policy as well as the techniques necessary to embed best practice. A sense of vision about what society means, and about what it is for, can inform the creative process of learning and skill development interventions. It can give a sense of value and direction to the design and development of employment structures. A lack of informed understanding about the meaning of work in contemporary society means that we could be forever condemned to repeat past mistakes.

The notion of *global citizenship* has recently gained prominence in international development discourse with the recently-adopted United Nations Secretary-General's *Global Education First Initiative* (2012). Among the three priority areas outlined in this global initiative, the third aims to 'foster global citizenship'.

> *"Education must fully assume its central role in helping people to forge more just, peaceful, tolerant and inclusive societies. It must give people the understanding, skills and values they need to cooperate in resolving the interconnected challenges of the 21st century."*

The notion of *global citizenship*, however, remains very broad, if not contested, and consequently difficult to operationalize in education. There are two possible reasons for this. Firstly, it is unclear whether the very notion of global citizenship is a metaphor, a contradiction in terms or an oxymoron (Davies, 2006). What does global citizenship possibly imply both from a legal perspective, as well as from that of collective identity, sense of belonging and civic engagement? Secondly, when applied to education the notion of global citizenship implies a certain degree of confusion. Is *global citizenship education* (or *education for global citizenship*) a wishful expression or is it a fundamental purpose of education systems in transformed learning environments?

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Citizenship itself can now be reformulated in terms of rights and obligations as well as potentially new forms of post-national citizenship. Educational institutions are the key to this complex process. They translate an explicit public policy at the heart of the reproduction of all societies. Indeed, beyond socio-economic development rationales, national education systems have fundamental social, civic and political functions related to the formation of citizenship, and to the strengthening of national cohesion. This poses a contradiction if national education systems are charged with developing conceptual frameworks and policy for global citizenship.

If citizenship education remains the preserve of sovereign states, it can be said that many *global trends* present a set of common challenges for all societies and countries around the world. The intensification of globalization is leading to greater collective acknowledgement that individuals and local communities are affected by global processes, and, in turn, that they may also affect them.

The study by Kerr (1999) indicated a shared concern with a perception of unprecedented global change across many countries and a resulting common set of challenges:

- Rapid movement of people within and across national boundaries;
- Growing recognition of the rights of indigenous peoples and minorities;
- Collapse of political structures and the birth of new ones;
- The changing role of women in society;
- Impact of the global economy and changing patterns of work;
- The effect of a revolution in information and communications technologies;
- Increasing global population;
- The creation of new forms of community.

In a compelling analysis, Tawil (2013) summarizes the main issues for learning and global citizenship:

> *"In more 'critical' approaches, the ethical starting point is the concept of social justice as framed by the international normative instruments of human rights. A median position is perhaps that of what Johnson refers to as 'environmental global citizenship' based on the central notion of sustainable development. All three posit, albeit in different ways, the interconnectedness of local, national and global realities, as well as individual responsibility at these various levels. They all arguably imply a sense of local and global solidarity and a commitment to action." (Tawil, 2013; p.6)*

Educational leadership

Not only do these trends remain valid in the current context, but many of them have also intensified and become more complex. This is particularly true of the new emerging spaces and forms of socialization, learning, and civic and political mobilization in today's digital world. A global economy would on the surface seem to suggest the need of some kind of

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global citizenship. The values of public education, critical reflection, access to valued learning outcomes and quality in education all rest upon a direct connection to the policy and principles embedded in the right to learning. There is an essential need for this discourse to move from the conjectural into practical ways and means to extend an operational vision of global education and citizenship as integrally linked aspects of the same phenomenon.

The changes produced in both the human and technical aspects of the globalization process shape how global education may now include various learning communities previously excluded by reason of prejudice, discrimination or remoteness. Contemporary education needs to support learners across the globe to transcend barriers and address conflict and persistent discrimination by means of skilful application of potent technological tools in the metamorphosis of traditional educational systems to meet unprecedented levels of socio-economic transformation. This also speaks of the critical importance of innovation and vision in addressing the key priorities for developing learning and transnationality to combat socio-economic marginalization. It is of interest that marginalized groups themselves can often be critically important springboards for new innovative learning methodologies.

The globalization process is at the core of labour market change in all countries. This has specific implications for learning designers and educators in terms of professional training, best practice and standards in approaching the diversity emerging within many communities. The pervasive globalizing process means no discussion on intercultural learning strategy can be undertaken without parallel international understanding and analysis of how new forms of cultural diversity impact on the learning needs of populations subjected to unprecedented levels of change.

Throughout all Member States of the European Union – and indeed in countries all around the world – there is growing concern about the capacity of traditional schools and education systems to change, adapt and provide an appropriate foundation for lifelong learning. It has become urgent for governments to review the ways in which schools are organized, the content of curricula, modes of delivery, design and location of places of learning and the integration of advanced information technologies into the overall educational structure. In such an environment it is important to evaluate and re-assess the role and function of schools in our society and the relationship between education and families, employment, business, enterprise, culture and community.

The OECD thinking on lifelong learning has produced a wide-ranging debate on the type of society we are presently constructing and wish to leave after us. Education and training are not just some abstract themes to be tacked on to the real business of making money. They are at the heart of what it means to grow and develop – both as individuals and as communities. That sense of community which is most threatened by the growth of social dysfunction, racism, violence and despair is best preserved in a context where people are allowed to learn and develop at their own pace with the satisfaction of knowing that their development feeds into processes of creativity and innovation for all.

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Much of this is echoed and cogently summarized in the International Implementation Scheme for the United Nations Decade of Education for Sustainable Development which interweaves the four strands of human rights, social and economic justice, environmental issues, and cultural diversity. The multiple processes of globalization (in its various manifestations: economic, technological, social environmental, or political) are steadily transforming traditional conceptions and practices of citizenship. The consolidation of the international human rights regime, the greater interconnectedness and interdependence of individuals and groups across the world, and the emergence of new forms of transnational and indeed post-national civic engagement are all expressions of this transformation. Global citizenship as concept and method offers a viable way to liberate education and its associated technologies to serve truly human learning needs in ever more creative and innovative ways.

This also speaks of the critical importance of innovation and vision in addressing the key priorities for developing learning and internationalization to combat the effects of fragmented responses and the impact of socio-economic marginalization. It is of interest that marginalized groups can often be the springboards for new innovative learning methodologies. Developing new innovative and creative learning and application paradigms is critical (for a number of reasons) for both excluded citizens and the educators who engage with them in meeting the challenges of a globalized world and economy.

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CORK LEARNING CITY: TOWARD A COMMUNITY WIDE LEARNING ENVIRONMENT

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Introduction: Cork's Learning Environment both Societal and Educational

Cork has had a wide learning agenda for several decades. As early as 1911 the university was already offering extra mural education. A few years later it was engaging with trade unions offering courses for working men, through the support of the City Corporation (City Council). That tradition took off in earnest in 1947. In Cork throughout the 20th century there were experiments around broadening education and the development of new educational models. From this base the city, through the Cork City Development Board, engaged in a two-year consultation ahead of launching a vision for the city over a ten year horizon called *Cork 2002-2012: Imagine our Future*. *Imagine our Future* included a *theme* on *Cork as a Learning City*, with an orientation towards an all encompassing flexible learning model: "We see learning as a life-long activity for all our citizens and not as something to be pursued only by young people" (Cork City Development Board, 2002; p.91). This plan established a Cork City Learning Forum representative of a wide range of stakeholders. However its most significant legacy was the establishment of the Cork Lifelong Learning Festival. This festival was launched in 2004 and steadily grew in scale and reach into the community to a point where there are now in the region of 500 discrete activities offered by all types of providers non-formal, informal and formal in an annual week long festival. All activities are free and are open to the public. The participation of ordinary citizens during the festival is impressive. The idea of developing a festival was prompted by key educational influencers. It emerged into a very fertile environment in a city that was already extensively networked and became an instant success. It mobilised and animated a wide range of actors and provided the context through which the subsequent Learning City project blossomed. The idea of a learning city became embedded in public consciousness, there was buy-in for the concept from a wide range of stakeholders and it gathered momentum with the growth of the festival and through international engagement with PASCAL International Exchange (PIE) which also delivered the EcCoWell concept and ultimately opened the doors that led to a 2015 UNESCO Learning City Award. The community wide learning environment is an exciting mix of local innovation and participation and engagement with global networks of cities who are developing their own learning environments under a number of learning cities umbrellas.

Cork's Learning Environment: Four Circles of Learning

The Cork learning environment is one that is solidly embedded in the community, with both strong local resonance and with global reach through its connection with both the UNESCO learning cities network and its ongoing engagement with PASCAL International Exchange, which has both online and real time dimensions. The environment can be seen as having four actively engaging circles that overlap with each other, yet accentuate different dimensions of a learning city. The four circles are the Cork Lifelong Learning Festival; the UNESCO Learning City Award and GLLiC (Growing Lifelong Learning in Cork) its interagency committee that also has private citizen membership; Learning Neighbourhoods which is a pilot project of UNESCO Learning City, but very much influenced by and connected into PASCAL International Exchange (PIE); and EcCoWell which is a concept emerging from PIE that endeavours to extend learning cities to include environmental, economic, health, wellbeing and lifelong learning to achieve and maintain good societies. Cork is an early adopter of EcCoWell.

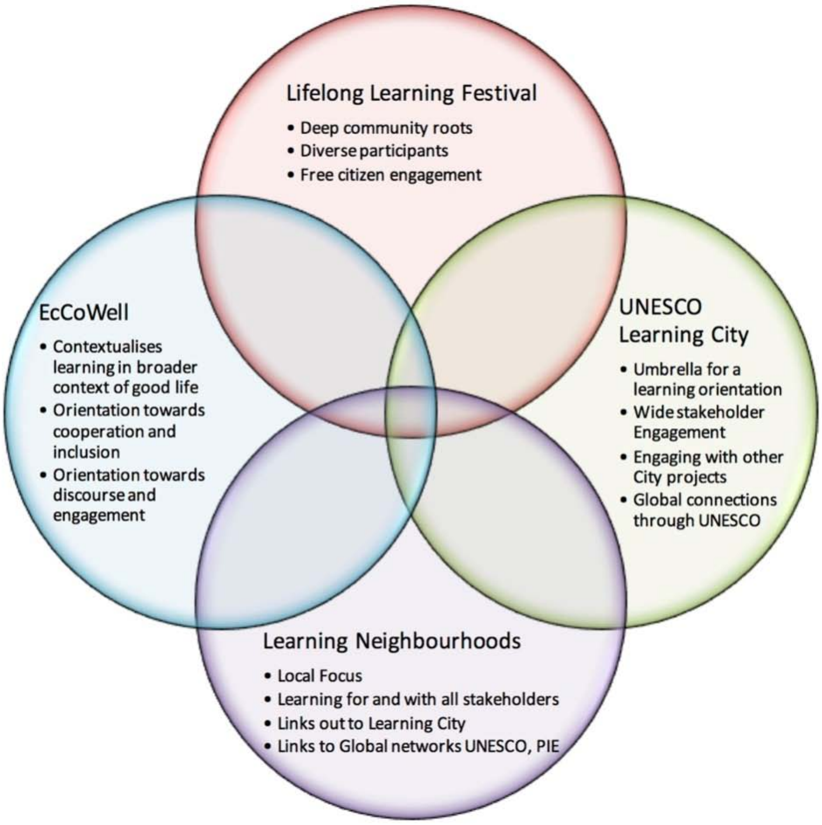

Figure 18. Cork Learning Environment – deep community glocal model

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Lifelong Learning Festival

Deep community roots

The lifelong learning festival is premised on principles that encourage and enhance community participation. The success of this commitment across the community is demonstrated by the inclusion of about 500 events each year. Additionally the festival links in with Cork's ten Community Education Networks which were established following the Irish Government's *Learning for Life: White Paper on Adult Education* (2000). Eight of the networks are based in disadvantaged communities. Each network in encouraged to offer activities. This gives the networks an annual impetus to engage with their own communities and helps them to remain active. The stakeholders within these networks include "Family Resource Centres, Home School Community Liaison teachers, the Travelling Community, Adult Basic Education & Literacy Services, Third Age Learning Groups, Disability Groups, and others" (Kearns, Lane, Neylon, & Osborne, 2013; p.92).

Diverse participants

The festival is promoted through posters in all kinds of public buildings from ones like schools and libraries to cafés and pubs. This often captures members of the public that are less conversant with online modes of communication, but it also brings the event to the attention of citizens as they go about their daily lives and in social contexts. This approach has a significant impact in capturing members of the public who may not be consciously currently engaging with learning. A brochure with all the festival activities is distributed widely through engaged stakeholders. This also brings the festival to sectors of the population that might not be actively engaging online. It also raises the visibility of the festival and is a useful companion for those who visit several events during the week. The festival has a special relationship with the *Evening Echo*, a daily Cork newspaper, and gets coverage in other local newspapers and radio. It is promoted on Cork City Council public banners in the city centre. It is also promoted online through a webpage and social media. The success of this determined outreach focus is that the range of providers is extremely diverse and the participation of citizens of all ages is very high. The festival has firmly established itself as one of the major annual events in the city. To grasp the full canvas of activities and providers it is necessary to browse the programme of events, which can be seen online, the link to the 2015 festival is: http://issuu.com/learningforum/docs/lll_prog_2015_full.

Free citizen engagement

The ethos of the festival is to actively encourage as wide as possible engagement by citizens. This point is eloquently emphasised in Neylon and Barrett's description of the festival as being "about equality and inclusion – about giving everyone the opportunity to engage in learning" (2013; p.125). This is echoed in the 2015 programme, Ted Owens, Chair of the Cork Learning Forum and chief executive of Cork Education and Training Board (a joint-lead sponsor), makes a statement typical of those involved with and committed to the festival since its inception:

> *"The festival has always prided itself on being inclusive, giving everyone involved in all forms of learning in the city the opportunity to celebrate and to showcase their activities, and to encourage others to take part and go further in their learning." (Cork Learning Festival, 2015; p.3)*

Inclusiveness, free entry and open access to all are consistent themes of the festival. Some events are naturally limited by the size of venue etc. but the focus in nonetheless inclusion rather than exclusion. The festival is also about accessibility so there are no preconditions for attending events and "as many events as possible are hands-on, allowing the public to join in as well as watch" (Kearns, Lane, Neylon, & Osborne, 2013; p.94).

UNESCO Learning City

Umbrella for a learning orientation

Imagine Our Future put the goal of making Cork a learning city very much on the agenda: "The city will have a flexible and accessible learning system for all" (Cork City Development Board, 2002; p.92). Both the creation of the Cork City Learning Forum and the initiation of the Cork Lifelong Learning Festival put real impetus into this project. The Learning Forum enabled dialogue across the full educational canvas of the city. The festival provided a public tangible demonstration of what a key element of a learning city might look like. It also became the vehicle through which the concept could be elaborated across the full spectrum of learning in the city. It became Cork's flagship lifelong learning event, attracting the attention of PASCAL International Exchange (PIE), which helped Cork engage with the UNESCO agenda on learning cities. Cork City Council's commitment to the learning city idea, is demonstrated by its ongoing support of the festival, the adoption of the Beijing Declaration by the elected members in April 2014 and in 2015 the generation of a Memorandum of Understanding between Cork City Council, University College Cork, Cork Institute of Technology and Cork Education and Training Board to drive Cork's UNESCO learning city agenda.

Wide stakeholder engagement

The Lifelong Learning festival provides both a stage for the concrete realisation and celebration of learning and platform off which it can grow. It also provided an existing core network for both EcCoWell and subsequently the Learning City. In both cases additional stakeholders were able to engage, with the confidence that the learning festival was a vibrant and successful model. Through the Lifelong Learning Festival's engagement with the Community Education Networks and with its 500 annual events it already had established a very deep rooted learning environment across the entire city. The level of engagement with the economic sector was not as robust. However, given the Beijing Declaration's second commitment: "Enhancing economic development and cultural prosperity", which envisages that "In developing learning cities, we will enhance economic development and cultural prosperity" (UNESCO, 2013; p.3) the Learning City committee, GLLiC (Growing Lifelong Learning in Cork) coopted a representative of industry onto the committee in 2015, with the intention of enhancing participation of the economic sector.

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Engaging with other City projects

The Cork Learning City project is already connected to many other city level programmes as many share a common link with Cork City Council. In line with the EcCoWell philosophy the GLLiC committee reaches out to sister programmes, there are significant network shares between the groups. Among the significant other city level programmes are Cork SMART Gateway, Cork Healthy City initiative, Towards Cork as a European Green Capital, Towards Cork as an Age Friendly City, IT@Cork, and Cork Innovates. From the very beginning it was envisaged that there should be complementarity and synergy between all of these types of initiatives. *Imagine Our Future* for instance made an explicit connection between the learning city agenda and Cork as European City of Culture in 2005 (Cork City Development Board, 2002; p.95)

Global connections through UNESCO

UNESCO provides a network through which it is possible to engage globally. Cork has close links with Swansea, which also received a 2015 UNESCO Learning City Award, as they have a twinning agreement since 1991. It has connections with Melton in Australia on addressing common approaches to developing aspects of learning cities and has informal links to other cities through UNESCO, many of which have not yet received a UNESCO award. Through the PASCAL Internal Exchange network it also collaborates with a number of cities including Glasgow, Hume, Wyndham and Vitoria-Gasteiz.

Learning Neighbourhoods

Local Focus

Two Cork city neighbourhoods are included in a pilot phase under the framework of Cork Learning City. Both are neighbourhoods that experience high levels of socio-economic disadvantage, though they have different demographic profiles. Knocknaheeny in the north-west of the city has the higher levels of exclusion, has a lower age profile and is a newer community. Ballyphehane is on the south side of the city with a much older age profile and a longer established community. In both cases the emphasis has been to encourage a bottom-up approach and as wide as possible neighbourhood reach. Public engagement exercises have been conducted in both localities and the agenda for activities for the first year of the project has been primarily shaped by local inputs.

Learning for and with all stakeholders

The definition adopted by the Cork team is:

> *"A Learning Neighborhood is an area that is constantly strengthening its practice in learning, providing a diversity of learning opportunities for the whole population through partnership and collaboration" (Ó Tuama & O'Sullivan, 2015; p.3).*

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The intention is to include as wide a range of stakeholders as possible. In the initial consultation invitations were sent to all types of statutory, voluntary and community groups not just those ostensibly involved in the educational sphere, for instance those involved in sports, cultural, hobbies, health, disability, social services, the credit union. It was made clear that private citizens were also welcome. Neighbourhoods are strongly encouraged to include local enterprises, shops, etc. in order to be as inclusive as possible and to capture the cross-community scope envisaged by EcCoWell. Both neighbourhoods are committed to public branding, use of direct citizen engagement through a public poster campaign called *faces of learning* and given the reach of the Lifelong Learning Festival in both areas there is already an orientation towards inclusivity.

Links out to Learning City

The Learning Neighbourhoods are represented on the GLLiC committee through three of the four Learning City MOU partners: University College Cork (the Hub for Learning Neighbourhoods), Cork Education and Training Board and Cork City Council. The joint-Chair of GLLiC, who is also Chair of the Lifelong Learning Festival, is a member of the Learning Neighbourhoods Steering Committee. The Coordinator of Learning Neighbourhoods is a designated member of GLLiC.

Links out to Global networks UNESCO, PIE

Peter Kearns of PASCAL International Observatory is an honorary adviser to Learning Neighbourhoods. His advice was instrumental in the design phase. This has the impact of bringing inputs from PIE to the project and also bringing learning from the Cork project to a global community. Through Cork's engagement with UNESCO dissemination of progress in the Learning Neighbourhoods will continue to feed into the global sphere. The project is also engaging in bi-lateral learning with three Australian cities Melton (another UNESCO award city), Wyndham and Hume.

EcCoWell

Contextualises learning in broader context of good life

"Achieving environmental, social and economic sustainability is central to the future of learning cities" (Osborne, Kearns, & Yang, 2013; p.416) and addressing this challenge is the raison d'être of EcCoWell. Translating the concept into reality is relatively new "a few cities, led by Cork in Ireland, are starting to address the question of how an EcCoWell approach can be implemented" (ibid.). Peter Kearns is the chief architect of the concept of the EcCoWell city. He describes this category of city as:

> *"… a new generation of Learning Cities that reach out and connect up to address environment, health, cultural and well-being issues while continuing to address the lifelong learning, social justice, equity and community building initiatives that have been the traditional territory of Learning Cities" (Kearns, 2013; p.40).*

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He holds that *silo policy* is obsolete and thus highlights the necessity for approaches like Learning Cities, Healthy Cities and Green Cities to converge into a common synergistic approach to deliver better outcomes for citizens. An EcCoWell city brings all of these dimensions into communion generating a city that is "inclusive, sustainable, and fundamentally democratic, and which foster the well-being of all" (Kearns, 2013; p.44)

Orientation towards cooperation and inclusion

Barrett and Neylon (2014) propose that five precursors enabled the EcCoWell idea to gain traction in Cork. The first they term *networks*, which includes pre-existing networks onto which the idea was grafted following an initial introduction of EcCoWell at the 2012 Lifelong Learning Festival. They speculate that the networks were particularly effective given the size of the city and an ethos of solidarity. The second precursor was *an underlying or overarching strategy* which was enabled by the *Imagine Our Future*, which highlighted the benefits of cross-sectoral engagement. The third precursor they term *trust* which exhibits as a solidaristic culture nurtured by the Lifelong Learning Festival's emphasis on parity of esteem among participating partners. The fourth they term as *freedom*, this is about participants being less focused on their affiliations and more oriented to engaging because they want to contribute. The fifth is *inspiration*, this is about the external recognition that Cork received from PASCAL and subsequently from UNESCO for its model of lifelong learning and cooperation.

Orientation towards discourse and engagement

The EcCoWell approach is oriented towards discourse and seeking to promote dialogue beyond silos and vested interests. This orientation has been strongly advocated in Cork and has worked remarkably well in helping individuals see past their own patch and consider a wider canvas. One of the significant reasons why this has been possible is that most fora are organized using *Open Space Technology*. In brief this is a method that facilitates open exchange in non-hierarchical groups, with a high degree or flexibility and with more emphasis on keeping the process open than sticking to rigid agendas. In the words of Owen Harrison, who pioneered the method, it as anomaly that works, especially "in those situations where highly complex and conflicting issues must be dealt with, and solved, by diverse groups of people" (Harrison, 2008; p.7)

Conclusion

Longworth has been one of the influential figures in promoting the idea of learning cities, interestingly he frequently uses the term community, which gives the concept a sense of being grounded at a human level. He sees the potential for "a new world of linked Communities of Learning in which knowledge and expertise and talent are shared with each other through electronic links" (Longworth, 1999; p.7). This captures well the learning environment emerging in Cork. There is a very strong sense of local grounding through the Cork Lifelong Learning Festival and Learning Neighbourhoods, but there is also an overriding sense of being outwardly connected in both of these and also in the other two circles, the UNESCO Learning City Award and EcCoWell.

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This environment has been evolving over an extended period, but it went through three moments of change that are leading to significant individual and collective possibilities within the city itself and in other communities and cities through mutual learning.

In Cork's case the big shifts came through *Imagine our Future*, which gave a structure for a process that was already emerging. It established both the Cork City Learning Forum and the Cork Lifelong Learning Festival and it gave an official stamp to a new era of livelong learning in the city. The Lifelong Learning Festival delivered a significant, tangible and community based realisation of the new learning agenda. It produced a sort of snowball effect, which in turn linked in with PASCAL International Exchange and the adoption of EcCoWell as way of shaping lifelong learning and extending its meaning to capture a more holistic society wide set of dimensions. These moves pushed the agenda towards a more formal recognition of Cork as a learning city. This was expressed in a motion of the city council, the coming together of the city with three of its most significant educational stakeholders in a memorandum of understanding and the pursuit of the UNESCO Beijing Declaration. This is a constantly evolving landscape, with a whole range of potential futures, however the period between 2002 and 2015 has been an exciting and innovative period for the creation of a new type of learning environment in Cork.

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RECASTING "WIKINOMICS" IN EDUCATIONAL ENVIRONMENTS – CASE STUDIES IN THE WIKINOMICS PROJECT

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Re-introducing the term Wikinomics

Tapscott and Williams (2006) and Leadbeater (2007) are the experts that introduced and framed the socio-economic term *wikinomics*, internationally. They, essentially, described a new world of web-based economics where cultural values such as participation, collectivism and creativity are its foundation. These values not only form the new business models of the digital economy, but their declared cultural roots suggest an ideological paradigm shift: a move towards a restructuring of post-industrial societies and economies.

The basic principle of this transformation is the following: the new services are created by crowds of (mostly) anonymous users who define their own informational, expressive and communication needs. This process is often called *mass creativity* or *peer production*. As a result, the conventional hierarchical business model of producer–consumer is rapidly replaced by the so-called *co-creation* model (Prahalad & Ramaswamy, 2004). Mass creativity, peer production and co-creation are blurring the distinction between collective (non-market, public) and commercial (market, private) modes of production, as well as between producers and consumers.

In both works of Wikinomics (Tapscott & Williams, 2006) and We-Think (Leadbeater, 2007) *mass collaboration* and *communal creativity* shape the way in which people will work and live in the future. The Internet and the World Wide Web, with the software and service infrastructures built on them, enable people to participate in the economy by being creative: *smart firms* better harness this collective capability, in order to spur innovation and growth. In these events, consumers become workers, devoting some of their time, effort and imagination to developing products for one another.

The wikinomics described above has often been dismantled as a subtle form of exploitation of unpaid labour: its main idea being the outsourcing of labour to globally distributed customers and collaborators that act as prosumers so that labour and other costs are reduced. In this line of thinking, exploitation expands to the realm of spare time, as prosumers, as a tendency, deliver unpaid surplus value. In other words, companies can design and assemble products with their customers, and in some cases customers can do the majority of the value creation. This trend is not a novel form of management and organization and it connected with the goal of an increasing competitive advantage and the reduction of humans to economic reason in the last instance (Fuchs, Blachfellner & Bichler, 2007).

Another space of criticism, that the established Wikinomics approach creates, is the promotion of certain form of individualism. Treating subjects as anonymous information organisms can be quite problematic, as to how empower and enforce a culture of sharing within innovative structures of collaboration. As Fred Turner (2006) has analysed, the key to this seamless concatenation of communalist thinking and good business sense was the ability of its propagandists to speak within multiple registers simultaneously: the discourses of economy as well as the discourse of friendship and community-building.

The Wikinomics project approach

The Wikinomics project recognizes the contradictions and tensions described above. Its fundamental concept is to go beyond them by adopting a positive learning and experimenting approach. It acknowledges the field of technical education as the cornerstone and the primary testbed of its efforts. It aims that the trainee reuses its outcomes and has an opportunity to develop expertise in a particular group of techniques. It integrates free culture and wiki-based methodologies to achieve autonomy and collaboration both of the trainer and the trainee.

Most importantly the Wikinomics project content creation, evaluation and dissemination process embody the existence of a community of practices among VET and other training actors, both at a European and international level. The transfer strategy of the project consisted of three crucial elements, already at the heart of the Wikinomics practices, and transverse all project actions:

- Reuse of good practices in the project that have already been tested at national and international level, both on VET and wider contexts: an example of this is the adoption of the TEDx conferences practice and methods, in order to organise passionate and engaging events that circulate Wikinomics concepts. TEDx organising is not only a dissemination activity but was deployed as a (a) way to connect and spread ideas, (b) space of networking and working cooperatively, (c) learning experience on running inspiring events, (d)opportunity for volunteers to participate in wider national and international communities.
- Build generic content, then allow for multiple localised sub-products matching partners needs and languages. In this sense, innovative and open, VET compliant, results were deployed in partners' custom training activities (Wikinomics training module and toolbox, 2015). Inviting partners to reuse generic content and introduce localised sub-products, means that they have a large spectre of open and custom tools and activities to implement, that themselves can reproduce and disseminate openly.
- Introducing collaboration with external communities, scale and team within larger coalitions. This was illustrated, notably by the introduction of the WikiAngels and the

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TEDx international networks, as well as, the Wikinomics Badges that will be further pursued with more experts (WikiAngels, 2015) and institutions.

These elements proved to be challenging to implement but with enormous value in terms of innovation collaboration and sustainability of these actions.

Wikinomics training implementations and relations with ECVET

Lifelong learning involves understanding that nowadays learning happens everywhere, every time, throughout life and in a range of situations. The European Framework of Key competences for Lifelong Learning defines key competences as knowledge, skills and attitudes applied appropriately to a given context. Key competences represent a multifunctional, transferable package that includes knowledge, skills and attitudes that all individuals need for personal fulfilment, inclusion and employment (European Commission, 2006). These competences add value in the labour market and in the field of social cohesion and active citizenship by providing flexibility, adaptability, satisfaction and motivation. Moreover, in order to encourage the development of key competences, all educational actors (learners, teachers and communities) should be supported in developing new concepts through innovative, non-traditional avenues and venues in which learning can take place. The approach of this project emphasises the importance of understanding that collaboration strategies are essential. The development of these competences is fully coherent with the ECVET framework. They are both based on a socio-constructivist approach which gives learners opportunities to practice 21st century skills related with communication, knowledge sharing, critical thinking, among others.

The Wikinomics project and its pedagogical approach is related with ECVET framework as well as it develops key competences within collaborative strategies using some of the key strategies included in ECVET framework, such as qualification design. This includes units of learning outcomes as a qualification component, consisting of a coherent set of knowledge, skills and attitudes that can be assessed and validated. Or, another example, accumulation process of learning outcomes. This process is based on the assessment, validation and recognition of learning outcomes. Various tools can facilitate this evaluation. Among others, in this project we highlight accreditation tools based on badges, which can help engage students in learning, and broaden the avenues for learners of all ages to acquire and demonstrate their skills, as well as the recognition of soft competences that are not recognised by formal education. Open Badges are closely related to the ECVET framework, considering that a badge can serve to communicate learning across the peer, interest and learning contexts of one's life. In the Wikinomics project, collaborative skills are closely related to Open Badges because OB can help to display, recognise and validate different skills and professional credentials, which are not normally recognised in a VET context or even in a professional framework.

As mentioned above, one of the main goals of the ECVET and other similar initiatives in Europe is to foster the recognition and valorisation of learning outcomes between countries and/or contexts. This *transparency* of qualifications needs to be based on an approach that

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enables qualifications to be defined in terms of learning outcomes, which ensures a better understanding of qualifications and learning achievements across contexts and even across countries. Moreover, specific procedures and criteria should be defined and taken into account when designing VET scenarios. Regarding the evaluation and assessment process used in this project, also related with ECVET framework, we highlight the evaluations of the acquisition of key competences. These are understood not as a development of common tools but the criteria for its interpretation, taking into account the complexity involved in assessing soft competences within the scope of the ECVET.

Competence-based assessment makes use of several tools that can be developed for teachers, students or the other agents involved. In this respect, when students gather some experience it can be useful to offer them the possibility of carrying out self-assessment and peer-assessment in order to gain awareness of their own level of proficiency and what they are able to do. Some examples of these assessment tools are: portfolios, self-reflection activities, reflexive journals, surveys, peer-reviews or quizzes, among others. These tools have been used in all the implementation of the following case studies.

Description and evaluation of the implementations

In this sense, before developing the analysis done of the data collected, is relevant to make note that there are two previous considerations. Firstly, it is important to note that the project main goal is to develop transferable skills that can be applied in different VET sectors. Usually, and in this project that also happens, there are substantial differences between the different contexts of implementation. The second consideration concerns the geographical areas. Different learning scenarios have been designed and used in the Wikinomics project, concretely in the following areas:

- Switzerland: "The road to Wikinomics";
- Poland: "Learning how to track changes and limit damage on collaborative websites" and "Tagging and reusing images in a wikinomics way";
- Portugal: "Creating a Small Business: from business model generation to client development";
- France and Zaragoza: "Entrepreneurship and companies' innovation".

Given these two considerations to evaluate the experiences, the methodological approach that has been chosen is the case study (Stake, 2006; Yin, 1994). The case study strategy is based on a research method that involves a process of inquiry characterized by a systematic and in-depth study of cases developed by unique social organizations or education institutions. The purpose of the case study is to know all parts of the case to create hypotheses or making decisions in a particular natural context. Considering the aim of the research strategy chosen, we can summarize the types of studies proposed by Yin (1994):

- Descriptive: the purpose is to analyse how a phenomenon occurs within its real context. It presents a detailed report based on the case, without the prior assumptions

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or theoretical foundation. Generally it provides basic information on programs and innovative practices.

- Exploratory: try to get to an event or a situation about which there is a well-defined framework.
- Explanatory: seeking to develop or refine theories for what they reveal the causes and processes of a certain socio-educative phenomenon.
- Evaluative: the study describes and explains the case but also aims to formulate value judgements that form the bases for decisions.

The design of the case study can be based on a single case or multiple cases that can be compared (Stake, 2006). The aim is to match the results of different cases, which would add validity to the theory proposed. In the Wikinomics project we have chosen to design many cases, prompted by the composition of teams from various partners and therefore several socio-educational designs.

The next steps for this analysis will be: first it is described the experience of the trainings, a description that will enable comparisons and identify factors of success; and then based on the results of the descriptive-comparative phase we can make some proposals of further work or subsequent courses to ensure greater effectiveness of the training and learning outcomes achieved. The descriptors used to describe the training cases include the planning scheme and a SWOT analysis. For the analysis of the results, the following dimensions have been taken into account:

- Context: centre, VET, platform, course topics;
- Users;
- Methodological approach;
- Planning: objectives, competences, schedule, activities, evaluation;
- Rating: users and teachers.

Results on the case studies

The four teams filled out a questionnaire detailing the process followed in the implementations. The project is organized into different dimensions or categories of analysis, which are discussed.

Description of the dimensions of analysis

Context (institution, connection with VET and course subjects)

The institutions where the courses were implemented were schools of higher education. Two of them are directly connected to the vocational education and training (VET) system of the country of implementation (the Polish team and the Portuguese team) and the others include professional training in university contexts. The subject of the courses was collaboration in virtual environments and wiki culture applied in different disciplines. All the courses were included as part of other studies or courses either as elective or required modules. In the case

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of the HEG, this institution is indirectly part of the Swiss tertiary vocational training system and students come from basic professional training. In the cases of Zaragoza and Toulouse, the courses aimed to develop entrepreneurship in individuals who may be involved in start-ups or spin-offs, and therefore the point of this training is that it can be applied in any professional sector. In the case of Poland, the training was closely tied to the development of the country's vocational education system, given that the certification obtained in the training is recognised by the Poland VET agency and is comparable to the European system of qualifications. In the case of implementation in Geneva and Poland, the subject of the course focused on wikinomics culture (social bookmarking, collaboration systems). In Zaragoza, Toulouse and Porto, the subject also focused on collaborative processes but in the context of entrepreneurship and innovation in the areas of biotechnology and business.

Users

The courses involved a variety of groups, with a total of 150 students: 18 on the Swiss team, 28 on the Belgian team (10 in Toulouse and 18 in Zaragoza), 40 on the Polish team and 62 on the Portuguese team. There was a varied demographic profile: different age groups, from 18-year-olds to individuals over 45; men and women, although predominantly men; and different levels of education, from individuals with a low level of education to individuals with higher education, instructors and skilled workers. In the case of implementation in Switzerland, profiles were young people from 22 to 28 years old with a profile that included instructors, students studying a second bachelor's degrees and skilled workers. In Toulouse and Zaragoza, the profile of students, who were from 23 to 37 years old, was doctoral or postdoctoral students interested in entrepreneurship for their professional future. In Poland, profiles were essentially professional men in the construction industry who wanted to certify their professional skills, also teachers of foreign languages, social economy workers, and IT students In Porto, participants were young people and adults regardless of their level of education who were interested in carrying out a project of self-employment or entrepreneurship.

Educational and methodological approach

Most of the implementations were conducted following an educational approach that combined collaborative work with individual work along with the support of teachers in theoretical explanations and the completion of activities. The structure of the courses combined classroom sessions involving theoretical explanations or student presentations of their work with virtual sessions involving individual and collaborative work. Only the Polish team used exclusively a virtual structure, and its focus was the most traditional, primarily based on contents being transmitted by the expert. Different tools were used for the virtual part: Skype, storage systems like Dropbox and Google Drive, social bookmarkers like Diigo and ZOTERO, and only the Portuguese team used the LMS platform Blackboard. In the case of the implementation carried out in Switzerland, the focus was on collaborative work as well as on the presentation and discussion of theoretical aspects. Instructors acted as content providers with participants acting autonomously. Training was mainly conducted in the classroom with specific online results. The courses in Toulouse and Zaragoza were also based

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on traditional presentations combined with collaborative work through the problem based learning The training conducted in Poland was primarily conducted online, except for the evaluation, which was done in the classroom. In this context, the theoretical explanations by experts were also combined with practical group and individual work by students. The courses in Portugal combined an iterative process of theoretical explanations, independent work, group-based improvement and presentations of results.

Course planning (objectives, skills, hours, activities, evaluation)

In most cases, the courses were short, lasting from 15 to 40 hours. The skills sought to be developed were related to collaborative culture in general (roles, attitudes), to the learning of tools that aid collaborative processes (publishers, licenses, presentation and communication, etc.) and to critical thinking. Noteworthy activities were practical exercises, studying and solving case studies, and completing projects. The following strategies were used to assess learning: the e-portfolio through the platforms used, self-assessment using a personal journal, and joint presentation of group work. The evaluation was formative as well as summative in some cases: a final exam conducted by the Polish team and the presentation of a final project requested of students by the Portuguese team.

The certification of courses was conducted as part of a higher accreditation. Certification strategies with badges were only used in one case. Perhaps since it was part of other higher courses, the certification was included in the one used by these.

The course in Switzerland took place on 30 days over 15 weeks. The abilities addressed were those related to specific and technical skills as well as analysis systems and tools. The course also included cross-cutting skills related to collaborative work and the use of social tools. The activities allowing such skills to be put into practice were related to the use of tools such as Diigo, Zotero, CoWaBoo and Wikipedia. Everything was evaluated through the creation of a digital portfolio and by completing an evaluation form. The certification was included in the bachelor's degree.

The courses in Toulouse and Zaragoza lasted 12 days. The abilities were related to skills for entrepreneurship and innovation and tasks were based on solving case studies. The evaluation form included participation in classroom activities and the creation of an individual reflective journal.

The implementation which took place in Poland included seven days in the classroom (two hours per session). Abilities were related to collaboration, ICT literacy and information literacy. Activities were based on theoretical explanations and on putting such content (which was primarily related to the use of the digital tools Skype and Diigo) into practice. The evaluation was conducted through an onsite exam, since passing this exam enables individuals to obtain a certification that is officially recognised by the Polish vocational education system, which, in turn, is being restructured to bring it into line with the common European system of qualifications.

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Lastly, the training implemented in Portugal entailed three different training activities, each lasting 25 hours. The skills developed and the activities are consistent with the major educational modules existing in Portugal. Specifically, participants worked on skills for collaboration, communication and creativity. The activities conducted were: creation of a business project based on business models, structuring of the business idea using the web tool Canvas, and lastly presentation and discussion of the work done. Some of the tools used for this work were Dropbox, Blackboard and Drive. Evaluation of the training was formative (based on participation and development of the business project) and summative (evaluating the project itself). The certification obtained was issued by the sponsoring institution and the badges achieved were assigned.

Evaluation of the experience (by participants and teachers)

Participants

Teams provided participants with an online evaluation survey for the courses when the courses were completed, and results were for the most part satisfactory. The results for the Portuguese team centre on the need: (a) for additional workshops or courses to expand upon the subject, (b) to create networking opportunities during the course, (c) for a first customer program. The overall assessment by participants on the Polish team was quite positive with these areas to be improved: previous training of the target group considering the group expectations, competences and content should be set more carefully in relation to specific target group needs. The assessment by participants on the Swiss team was between moderate and high in the areas of motivation, activities, explanations by teachers, consistency of the course and the course's ability to promote skills. The assessment by the Belgian team was high in relation to organisation, educational approach, evaluation and usefulness.

Teaching staff

The opinion of teaching staff was positive in general on all teams, except for the Polish team, where it was low, although this type of course is seen as a potential opportunity for improvement for people with low qualifications. The main difficulties encountered by teachers vary from team to team. Those of the Swiss team were related to the teaching strategies used: specifically, they note how difficult it was to get students to participate more actively and to commit to co-learning. Those of the Polish team were related to the number of hours of the courses (considered to be too few) and to the structure of the courses. In this case, they do not think the virtual course on its own works; they think it would be better to combine the virtual course with the classroom course. And a third difficulty they note is some users' low level of knowledge of technologies.

Both the Polish team and the Portuguese team highlight the need for a prior training programme. The Portuguese team notes the need for participants to have a more specific profile and the need for more possibilities that enable learning to be customised based on participants' interests.

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Discussion, recommendations and further work

Discussion

The different contexts of implementation have certain characteristics that make it impossible to make a comparison between cases. That being said, there is a common design that is consistent with the abilities and learning outcomes developed in this project, which are in turn related to the cross-cutting skills established in the ECVET framework, particularly those related to digital literacy and collaboration, both of which are identified as key in developing the common European framework for vocational training. In terms of the educational approach, most of the implementations were carried out by combining collaborative work with individual work. Apart from this basis agreed by all instructors, some specifics of each implementation should be mentioned:

- In the case of training in the HEG, the content undertaken was directly related to the Wikinomics concept and its practical application.
- In the case of Zaragoza, Toulouse and Porto, emphasis was placed on entrepreneurial ability, a key issue in the demands of today's job market.
- Lastly, in the case of Poland, there was a direct relationship with basic vocational training, as participants were active professionals or professionals in training who were looking for a professional certification that provides them with recognition and mobility in the EU, a basic foundation of the ECVET framework.

The total number of participants in the implementations was 150 students in five countries. Although the number of participants was considerable, it was not possible to extend and repeat the implementations due to the short duration of the project and especially of its implementation phase. Given these constraints, the number of participants and the opportunity to implement the training in different contexts was viewed very positively. Particularly noteworthy were the implementations carried out in Portugal and Poland, cases in which the design of the training as well as its subsequent evaluation and certification were done in line with the national implementation of the ECVET framework, considering its specific requirements in terms of training modules, skills and certification.

Regarding the satisfaction of participants, it was high in many cases, although it should be mentioned that results were better when participants had a higher prior level of training. The instructors, for their part, had a positive opinion, and in the cases in which their opinion was not as positive, they believe that this type of course represents an opportunity for improvement particularly for recipients with low qualifications. One of the common difficulties was the need for prior training to familiarise participants with the tools to be used during the course, especially in the case of professionals who are not used to using ICT in their professional activity.

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Recommendations

Considering the dimensions analysed, we briefly discuss recommendations for further application, improvement and integration of the project results in training policies and practices. The design of the training as well as its subsequent evaluation and certification should be done in line with the national implementation of the ECVET framework, considering its specific requirements in terms of training modules, skills and certification.

Follow formal structure to design learning scenarios is a key point for future recognition. Based on the work developed on the Wikinomics project, the first step when it comes to designing assessment tools based on competences is the development of indicators that display certain operating conditions. Secondly, it is important that the outcomes are correctly documented in order to support the validation and usefulness across contexts and specifically regarding the national ECVET training modules. Learning outcomes can be achieved in formal, non-formal and informal learning contexts. The second level of definition must be completed by the teacher or trainer depending on the characteristics of the context, learning outcomes and assessment.

The development of collaborative key competences in this project is based on socio-constructivist approach in which learners are at the core of the teaching and learning processes that take place beyond time and space limitations. Some considerations to connect learning scenarios with user's interests should be taken into account, to ensure the motivation of the students as well as its implication in the training process:

- to know previous knowledge including, if it is needed, previous training programmes to be familiarized with collaborative tools. Moreover, it can be considered to include an initial assessment for joining sessions;
- to adapt the course planning (objectives, activities) considering the trainee's expectations;
- to expose realistic outcomes and meaningful training practices to their daily and specific job environment.

Concerning the methodological approach, it has to be considered the complexity involved in assessing soft competences within the scope of the ECVET. A competence based assessment is essential to be coherent with overall aims. This process should be based on formative assessment as well as validation and recognition of learning outcomes. Assessment cannot be restricted to grades, focusing solely on memorised information, but rather assessment must offer an opportunity to promote competences rather than to merely discover who has the highest level of proficiency. A high range of tools can be used to facilitate this evaluation, as long as it allows compiling evidences from the learning process and should be chosen based on the length of the course as well as students experience. In this sense, when students gather some experience it can be useful to offer them the possibility of carrying out self-assessment and peer-assessment in order to gain awareness of their own level of proficiency and what they are able to do.

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Among others, Portfolio, self-reflective journal, project based learning assessment or peer and collaborative assessment are some recommended assessment tools. All of these examples share the same design, based on active and discovery learning, in which students interact with their environments by exploring and handling objects, tackling questions and controversial issues or performing experiments. We would also highlight the opportunity to use accreditation tools based on badges, which can help students in learning as well as to acquire and demonstrate their skills. Beyond specific tools, to promote reflection along the learning process is essential to ensure that the learning process can be meaningful, based on the reflection of the own learning experience.

Conclusion

In this paper we tried to redefine the term Wikinomics, mainly, by exploring specific pedagogical practices in a project under the same name. We focused on specific collaborative competences as a response (a) to the original emphasis on individualism of the Wikinomics practices and (b) way to enforce a culture of sharing within innovative structures of collaboration and real life community-building.

Finally, we described the early implementation of different learning activities under the form of case studies structure (Context: centre, VET, platform, course topics – Users – Methodological approach – Planning: objectives, competences, schedule, activities, evaluation – Rating: users and teachers) and provided results analysis with recommendations.

These training activities, as well as, the majority of the project's activities will continue in 2016 providing these case studies with new results. More details in design and evaluation, as well as, revisited scenarios on collaboration in training activities would be needed.

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HAVE NEW TECHNOLOGIES IMPROVED ACCESS TO QUALITY HIGHER EDUCATION?

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Abstract

New technologies have transformed educational provision and learning in all sectors. However what has been their impact on issues of scalability, openness and access to education for all? The answer may appear straightforward; information and communication technologies (ICTs) have provided far greater opportunities for all to access a very wide range of educational provision, especially in the higher education sector. However, the issue is not that straightforward; simple provision of opportunities, even when scalable, does not necessarily provide real access and openness for many learners. The emphasis has sometimes been on ensuring the provision of opportunities, rather than considering what the outcomes are for student learning, partly perhaps because the outcomes are more difficult to measure.

The concepts of openness, access and scalability have also changed since the first *Open Universities* were founded, and even more so since the introduction of ICTs. This paper will review how the concepts have changed and the impact this is having. Have all these changes been for the better in terms of student success? The Open University, UK, for example, is closing eight of its 10 English Regional Centres, originally considered essential for student academic advice and support, because it is thought that learners can more effectively be supported from fewer locations and mainly online. While it is too early to assess the impact of this decision (finalised in November 2015), it is worth considering how far all previous changes in concepts and practice have been for the better in terms of student success.

This paper will review some of the key concepts of access, openness and scalability, and their changing nuances and implications. It will also explore tensions arising between delivering open access to online materials, such as Massive Open Online Courses (MOOCs), and the provision of high quality distance learning where internet access is limited.

Introduction and definitions

Issues of access are central to all forms of education. If people are unable to access the educational programmes that are provided, laudable and ambitious development goals in the field of education will be unattainable. Initially the term *access* was mainly used to indicate the provision of opportunities for those who were excluded by learning difficulties or disability from mainstream education. However, the term has since been expanded to cover all those who are excluded from full-time education for a far wider range of reasons, such as poverty, employment, location and gender. Much effort had been put into providing opportunities for all, but the basic provision of educational or learning opportunities does not necessarily provide full access for learners; real access to quality learning requires attention to a great many other factors. Some of these are reflected in the changing interpretations and definitions of the term *access* itself; some others have been partly resolved by the introduction of open and distance learning; many other issues have arisen with the introduction of ICTs.

Access to education was declared a fundamental right for all in the Universal Declaration on Human Rights 1947; it was adopted as Article 1 in the World Declaration on Education for All in 1990: "Every person – child, youth and adult – shall be able to benefit from educational opportunities designed to meet their basic learning needs" (United Nations, 1948; p.3). At the time, more than 960 million adults, over two thirds of whom were women, were illiterate; and over 100 million children had no access to primary schooling (p.2). However, measures to monitor improvement in access to education are often based on enrolments; for example, The Millennium Development Goal 2 "Achieve Primary Education for All" has made some progress in that enrolments in primary education in developing countries increased from 81% to 93% between 2000 and 2015 (http://www.un.org/millenniumgoals/education.shtml). Yet neither the provision of opportunities, nor enrolment figures, as all the studies on student retention illustrate, equate with successful achievement. This has been recognised for some time: "In preparing for a pan-African conference on the education of girls in 1993, the UNESCO Regional Office for Education in Africa (UNESCO/BREDA) presented a 'beyond access agenda' indicating that attention must shift from 'girls' enrolment' to 'girls participation in the real sense of the term" (Obanya, 2011; p.3). The Commonwealth of Learning's *Strategic Plan 2015 – 2021* confirms that "Providing access to learning alone will not be enough. COL will focus on quality learning that leads to positive outcomes" (The Commonwealth of Learning, 2015; p.9). The Consortium for Research on Educational Access, Transitions and Equity (CREATE) "uses an expanded vision of access that includes meaningful learning, sustained access and access provided equitably" (http://www.create-rpc.org).

This has led to a renewed emphasis on participation and engagement in a quality learning experience, rather than just the provision of opportunities. UNESCO's post 2015 agenda argues that "Implementation of the current education framework is viewed as limiting the focus to access, thus directing attention away from ensuring quality learning outcomes….The measurement of learning outcomes among children and youth is limited and, relative to measurement of access, more difficult to assess at the global level" (UNESCO, 2015; p.9). We would argue that equity and quality are central to successful access to educational and learning opportunities.

Equitable access is a major issue across the world with many people disenfranchised from learning opportunities, for example those in rural areas, women and some disabled people. Access to an equitable quality learning experience is also problematical, with increasing numbers of students having to rely on degree mills or unaccredited institutions because they

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are unable to access quality distance education or conventional routes to higher education through campus-based institutions. The Commonwealth of Learning's (COL) *Strategic Plan 2015-2021* confirms that "Access to quality education remains inequitable, especially in rural areas, with girls being particularly disadvantaged". (The Commonwealth of Learning, 2015; p.15).

Access to quality education also depends on *openness*, *scalability*, and sustainability all of which are contested terms. *Open Learning* for example, is an educational philosophy that emphasises learners' choices and has a social justice agenda; *Open Distance Learning* (ODL) combines ideas of social justice with the modes and media through which students and teachers interact (Gaskell, 2016). As noted by Bates, the open provision of materials, for example through OERs and MOOCs, is not enough; the contexts of learning are important.

Scalability is a more recent term and was originally used in the 1990s to refer to technological systems or business models that would offer the opportunity for continuing growth. The concept of providing educational opportunities at scale was one of the drivers for the development of Open Universities (Tait, 2008) but the exact term *scalability* has only relatively recently been applied in this context, particularly since 2000. Oblinger, for example, enumerates four "problems" that distance education can solve, the third of which is:

> *"Alleviating capacity constraints. Many states are expecting more college students over the next decade than their facilities can accommodate. Some are hoping to leverage the scalability of distance education to avoid overwhelming their bricks-and-mortar capacities." (Oblinger & Kidwell, 2000)*

Both access and scalability are of central importance to distance and online education and one of the major reasons for their success and promotion by governments. Many countries, for example China, Nigeria and India, cannot provide enough campus based educational opportunities for their growing populations. Scalability is essential and can be provided through printed, online and blended learning opportunities such as those from the National Open University of Nigeria (NOUN) and the Indira Gandhi National Open University (IGNOU).

The concepts of access, openness and scalability are interrelated and have evolved over time, particularly since the introduction of ICTs in the 1990s. They are critical elements in the *Iron triangle* of Access, Cost and Quality (Daniel et al, 2009). The rest of this article will review some of the impacts of ICTs in this context and illustrate some of the continuing issues through a brief review of some current MOOCs. The tensions between opening up education and providing a successful learning experience in context are explored, and the concept of *openness* reviewed.

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The impact of ICTs

ICTs have transformed distance education and made many educational opportunities available to a far wider range of people. They have also transformed methods of teaching and learning, with increased interaction between teachers, students and material, students and students, and between academics. In addition, new ways of learning are being explored which include co-creation of learning content and an increased emphasis on informal learning, rather than formally structured programmes. There are also many practical advantages for some; for example, in countries such as South Africa, students had previously to spend large amounts of time travelling to tutorials, whereas they can now access materials and engage with their tutors and other students online, if circumstances are favourable.

Online education is also more scalable than traditional face-to-face teaching in many ways. The main saving is the reduced requirement for teaching accommodation. Other potential savings can be the reduction of direct costs for institutions in terms of the creation of materials – once these have been created, they can be re-used extensively; and many of the delivery costs, for example connectivity charges, are met by students. However, depending on the type of online course, the cost-structure can be "much closer to face-to-face education than it is to mass-media distance education programs, although there is considerable evidence that academic staff spend more time teaching online courses than face-to-face courses" (Rumble, 2014; p.207).

However, there are some major drawbacks. The first is that using ICTs for learning requires good internet access, which is very unevenly distributed across the world. This is very clear from the World Bank data about internet users 2015: whereas 78% of the European Union population are internet users, only 19% in Sub-Saharan Africa and only 8.6% in the least developed countries use the internet. There are also differences within developed countries: in Germany for example, 97.5% of 14-19 year-olds are online, while only 30.2% of people over 70 use the internet (Rohs & Ganz, 2015). In addition, the language of many online resources, including Wikipedia, is English, which disenfranchises those for whom English is a second, third or fourth language; and the pedagogical approaches and subject matter tend to be derived from the western area of the northern hemisphere (Gaskell, 2016) which may not suit other cultures.

The impact of ICTs on openness, access and scalability may be explored through the example of MOOCs.

The example of MOOCs

MOOCs have been a source of contention since 2012 – the so-called *Year of the MOOC*. Advocates and providers such as Coursera claim that MOOCs provide significant opportunities for increasing openness and access – "We provide universal access to the world's best education" (https://www.coursera.org/about/). Critics argue that, "all that has really happened is that solid educational principles have been replaced by a mass communication model with very few principles" (Baggaley, 2013; p.370).

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What evidence is there that MOOCS have improved scalability, openness and access to Higher Education? Superficially, MOOCs are very attractive in that they provide open access (for those who have internet connections) to a wide range of subjects, taught on the whole by experienced teachers in higher education. For these reasons they can be of great benefit to professionals who are looking for some updating, or for the general public who have some interest in a particular subject. They are also scalable in most cases, as evidenced by the numbers enrolling; in 2014 Jordan's study of 279 MOOCs concluded that the median average enrolment was 42,844 students, but this declined as more courses became available (Jordan, 2014). Numbers still remain high: in 2015 alone, over 80,000 students registered to study *Enhance your career and employability skills* and over 25,000 registered on *Managing the Company of the Future* both offered through the University of London's International Programmes' MOOCs, developed on the Coursera platform (University of London, 2015). MOOCs also have reach: Coursera courses are studied in a large number of countries, the top five being the US, India, China, the UK and Brazil. London's *Enhance your career* is studied in 2011 different countries.

However, there are many barriers to successful study of a MOOC, the main one being reliable internet access as discussed above. While MOOCs may be open to those who can access them, there may still be barriers for those who wish to gain some recognition for their study. FutureLearn (based in the UK and led by the OU UK), for example, charges£34 (thirty four pounds sterling) plus postage for a certificate of completion; the German iversity.org charges €99 (ninety nine Euros) for a personal certificate (Rohs & Ganz, 2015; p.8). MOOCs from the University of London International Programmes offered through the US-based Coursera Consortium charge $49 (forty-nine dollars) for a general course certificate; and within course sequence specialisations, have differential pricing: $49 in emerging economies (Coursera definition: non-high income economies under the World Bank's country and lending groups classification) and $79 (seventy-nine dollars) everywhere else. These are significant sums for some of those who might otherwise gain from the opportunities provided by MOOCs. *Specialisations*: A MOOC specialisation is a multi-MOOC sequence completed by a capstone project. To date, Coursera has launched 34 specialisations. The University of London offers Responsive website development and design which consists of six MOOCs leading to a certificate for the whole broad subject

Further examples from The London International Academy illustrate the difficulties in making generalisations about MOOCs and their impact. Most of the London students in 2014 were in the age range 25-44 with the gender split being 40:60 female to male. But here lies the difficulty with generalisations; the MOOC on *Malicious software and its Underground economy* had a female/male ratio of 18:81 whilst the MOOC on *Supporting children with difficulties in reading and writing* had a ratio of 73:26 female/male. The vast majority of students were educated to bachelor degree or higher; the number studying who had not been involved in education post-school was less than 10%. This is supported by other evidence: 7161 students (less than 10%) of MITx's popular course on Circuits and Electronics provided data about themselves and 65% had degrees or higher levels of education (Haber, 2014; p.98),

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while the German and other examples from Rohs and Ganz (2015) indicated that MOOCs are "mostly used by people who already have a higher educational status" (2015; p.14).

MOOCs are therefore open to some, and scalable for many, but are attracting mainly students who are already highly educated. How far do they provide access to a quality learning experience? The content of MOOCs is often of very high quality, partly because it derives from existing University courses – and, more cynically, is designed to encourage students to register on the University's own programmes which would involve considerable fees. In London, for example, 55% of about 160 MOOC students who subsequently enrolled on degree courses, stated that their MOOC experience had influenced their decision to apply. However reliable statistics are difficult to acquire and evaluate.

We would argue that the provision of good, and even excellent subject content, is not enough; the context of learning is essential to provide a quality learning experience. One of the most important aspects of context is the availability of learner support. This can be provided in MOOCs to some extent through course design: for example Australia's Open2Study (https://www.open2study.com) which provides motivational feedback on online quizzes (*Well done!*) and allows the learner to collect various points and *jewels* towards a free certificate of completion and the award of the *crown jewels*. It can also be provided by moderated online forums, such as in FutureLearn's *Web Science*, offered by the University of Southhampton, where doctoral students welcome new contributors to discussion and pose and respond to queries; and also by peer support through online forums and peer assessment, as for example in FutureLearn's *The Night Sky*, offered by the Open University (https://www.futurelearn.com). However, all these examples come from MOOCs that have fixed start and end times (2, 4, and 6 weeks), and so students will be studying the same material at approximately the same time. In late 2014, Coursera launched a new platform called Ondemand which offers online open courses with no set start or completion dates. This has apparently proved very popular and Coursera will be withdrawing *session-based* courses by the end of 2016. On demand courses may well suit some but will almost certainly provide less student support in terms of peer cohorts who will find it difficult to support each other, or comment on each other's work, and doctoral moderators who will not be able to respond to constant random discussions.

One of the criticisms of MOOCs has centred round their low completion rates. Jordan's analysis of initial data for student completion indicated that a median average of 6.5% completed, that is, they satisfied the criteria for a certificate of course completion. However, a higher percentage (median 10%) actively engaged with the course though not fulfilling all necessary criteria for a certificate (Jordan, 2014; p.160). If active students only are considered, the percentage can be even higher. On Coursera's *Metadata* course, offered by the University of North Carolina, completion rates for students who watched at least one video was 15%; while the completion rate for those who did the first homework exercise was 48% (Haber, 2014; p.95).

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MOOCs therefore can be seen to increase scalability and openness of content (for some) but there is not much evidence that they are widening participation or having a major impact on developing the broader context of successful (or accredited) learning.

Discussion and conclusions

Openness, Access and Scalability are all related and are contested terms; their interpretation has changed over the last 40 years, and particularly since the introduction of ICTs in the 1990s. Openness in online education was given an impetus by the Open Courseware Initiative of the Massachusetts Institute of Technology (MIT) which in 2002 made all the material from 50 courses freely available online http://ocw.mit.edu/about/our-history/. UNESCO then coined the term *Open Educational Resources* (OER) to refer to: "the open provision of educational resources, enabled by information and communications technologies, for consultation, use and adaptation by a community of users for non-commercial practices" (UNESCO, 2005; p.1). But these definitions related to the open provision of online materials and not to the quality, context or outcomes of learning.

Online course content and materials are a great step forward for those who had previously been forced to rely on written information, often in very expensive textbooks and journals. Online access to the world's great library collections has also transformed study and research. These have provided inestimable benefits for experienced learners, who are also those who most frequently study free online MOOCs.

How does this relate to those who have limited internet access or are less experienced learners? It is clear that those who have limited or no internet access are increasingly excluded from new developments; the *digital divide* is potentially increasing, rather than decreasing. The illustration of MOOCs suggests that the main beneficiaries of new developments in ICTs are relatively experienced learners; MOOCs do not appear to be widening access or participation, despite their huge enrolments.

What is important is the quality of the learning experience, and the outcomes, especially for non-traditional learners. These raise many questions about the overall impact of ICTs. For example:

- How can we measure or evaluate successful access to open online materials such as MOOCs? Evidence indicates that they are studied mainly by those who already have higher educational qualifications; what could extend participation?
- For new learners, are online exchanges and discussions as satisfactory as those which take place face-to-face or over the telephone?
- Who provides any support? How far is support necessary to provide equitable access to a quality learning experience? Sometimes support may be provided by research students or administrators and may be excellent; but this is not guaranteed.

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- How can teaching staff continually update themselves on both new media and academic subject areas, while continuing to support their students, many of whom have increasingly demanding expectations of (for example) rapid response to emails? This is particularly relevant with the large numbers involved in some modules.
- How do we balance principles of access and universality for learners, with innovation and variety in adopting new Technologies?
- What are the key factors in enabling scalability and equitable access to quality education?

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PERCEPTIONS OF LEARNING ACTIVITIES AND LEARNING OUTCOMES IN A ROSE (RANDOM SHORT-TERM LEARNING ENVIRONMENT)

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Background

Frequently situations arise which may cause disruptions of the academic year due to weather conditions, pollution, political unrest or military tensions. These shut downs of the educational system may routinely span a week to a few months and may encompass an institution, a region or even be nationwide (Schweber, 2013; Day, 2015). There is evidence pointing to the adverse effect that cancellation of school days has on student achievements (Marcotte & Hansen, 2010). This also applies to students in higher education where absence from courses can affect their achievements or lead to a high dropout rate from courses (Bates, 2013). Day suggests that the number of cancelled lessons can reflect badly on an institution (Day, 2015) while Schweber (2008) stresses that there are students who would like to continue with their studies even during times of crises. Finally, carrying on with the routine is an important element in coping with emergencies, can help overcome emotional difficulties and trauma (Rush, Wheeler & Partridge, 2014), and can contribute to community resilience (Cahill et al., 2005, Leykin et al., 2013). On all of these accounts, it is important to avoid depriving students of their right to learn by implementing the variety of (ICT) tools that are widely available to instructors and students alike. The main challenge is to sustain academic continuity that will lead to satisfactory learning outcomes for the benefit of all students (Schweber, 2013).

A Random Online Short-term Environment (ROSE) is an unplanned online learning environment that continues for a limited period and functions as a seamless continuation of routine face-to-face learning. A ROSE is a form of blended-learning (B-learning) that has specific features. Students study in a space which is not always suitable for learning, in which the technological resources could be limited, and the learning process can potentially be disrupted due to the fact that other members of the family are present. In addition, there might be occasional external disruptions, as the need to seek temporary shelter, electricity outages etc. In addition many of the instructors participating in a ROSE are not versed in transforming learning content to online activities. Taken together these will degrade expected learning outcomes.

The current research can provide useful insights for higher education institutes planning to practice implementation of short time online learning environments for the purpose of formalizing an effective institutional response to disruptions of the academic routine.

Summary of literature

Continuity of operations (COOP) or Business Continuity refers to an organization's ability to maintain or restore its business when normal operations have been threatened or disrupted (Piran & Yanovsky, 2007 in Schweber, 2013). Lately this concept has been dealt with in an academic context, and has been referred to as Academic Continuity which represents (ibid: 151):

> *"a commitment on the part of educational officials to provide opportunities for students and instructors to remain engaged in their education despite external disruptions and for the organization to remain resilient".*

Academic continuity is, therefore, the process of preserving the academic core functions of the institution, while responding to a wide array of challenges that temporarily disrupt teaching and learning.

One example of preserving academic continuity was the Sloan Semester that was voluntarily set up in 2005, and served as a nationwide spontaneous response devised in order to enable Hurricane Katrina- and Rita-affected higher education students to continue their studies (Lorenzo, 2008). However, attempts to hold drills in order to practice for situations in which the educational system is shut down temporarily and unexpectedly are scant. It seems that only in Singapore there was an initiative to conduct annual drills in order to practice sustaining academic continuity in event of a disruption of the academic year as a result of the SARS pandemic of 2003, (Ho Tec & Leong, 2006; Chandran, 2010).

Methodology

The online event at the teacher-training institution Ohalo College was held during the week of Hanukah in which pupils attending the K-12 educational system are on vacation, while higher education institutes continue with regular studies, thus emulating a situation in which academic routine is disrupted for a limited period. This was the third consecutive year that an online week was held at the college during the week of Hanukah. All courses went online, and there were no explicit guidelines as to the type of activity, the tools to be used or whether the activity should be synchronous or a-synchronous. We assumed that most of the activities would be asynchronous, and we saw this as an advantage as it provided a flexible studying environment for the students.

The research was a Design-Based Research (DBR). The goal of this type of formative research (Gittelsohn et al., 2006) is to improve educational practices through iterative analysis, design, development and implementation, based on collaboration among researchers and practitioners in real world settings, and to lead to contextually-sensitive design principles and

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theories (Wang & Hannifin, 2005; Anderson, & Shattuck, 2012). DBR uses formative evaluation as a research method, and utilizes many data collection and analysis methods widely used in quantitative or qualitative research (Orrill, Hannafin & Glazer, 2003).

The number of students and instructors participating in the event was 1200 and 126, respectively. In order to maximize the rate of response students completed the feedback-form in-class. The responding groups of students were selected from various departments and years of study (i.e. 1st year, 2nd year etc.) in order to attain a sample group that was representative of the student body in the college, while an online feedback form was sent to all instructors. The rate of response for students was 36% and 40% for instructors. The feedback-form consisted of statements on a 5 point Lickert scale and an open ended question regarding suggestions for improvement. In addition we interviewed students (N=7) using a semi-structured interview. We made a distinction between regular students who participated in the event in previous years and students who were in preparatory classes who had never experienced an online week, and were assumed to be unbiased towards the event due to previous unfavourable experiences or to attrition. In addition, we could follow the effect of the elaborate preparations of students and pupils in the preparatory classes ahead of the online week.

Results from 2014/2015 indicated that it could prove useful to offer the instructors guidelines for designing proportionate activities in terms of time. Consequently, before the event of 2015/2016 we designed a tentative template for planning activities based on qualitative analysis of the verbal data from the student feedback and interviews of 2014/2015. In addition, we added questions to the online feedback forms of 2015/2016 based on the above template to study the nature of the learning activities.

Our research questions were related to learning activities and learning outcomes:

- What activities were perceived by the students as preferable? How do they compare with the activities that instructors actually gave during the online week?
- What were student perceptions regarding learning outcomes?

Results

It seems quite clear that watching videos and commenting was the most popular type of activity among the students. It should be added that in the verbal comments there were students who stressed that it is important to give short videos. It seems that students also appreciated pragmatic activities and particularly those that were a revision or of material that had been taught in the face to face meetings. On the other hand, not many students appreciated new material been taught in this particular environment.

It should be noted that 50% of the responding instructors did not make use of the template when planning activities, either because they felt it was unneeded or else because they did not know how to use it. We asked the instructors to mark the type of activities that they had given and compared them to the students' preferences. The overall picture showed that that there

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were differences in perceptions between instructors and students in regard to types of activities. Only in one instance namely, activities aiming to rehearse (go over) material taught in face to face meetings, there was a correlation between student and lecturer responses (30% for instructors; 36.2% for students). There was a certain correlation regarding the use of media- 34% of the responding instructors used media (videos, audio files) while 47% of the responding students marked this kind of activities as preferable. There was a negative correlation of over 20 responses in two instances: writing a text (instructors 42%, students 8.7%) and enhancing knowledge (instructors 62%, students 24.5%).

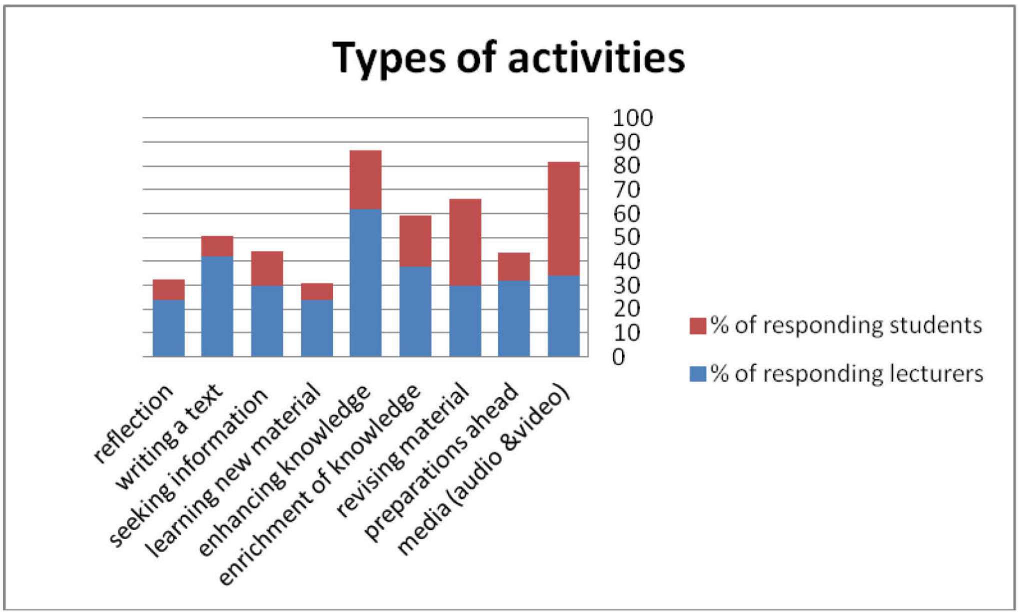

Figure 1.

As for features of favourable activities the main attribute marked by students was meaningful activities, on a personal level. In addition, students stressed the importance of activities that were proportionate in terms of the time that it took to complete an activity.

There were discrepancies between students and lectures in many of the parameters as is demonstrated in the following graph:

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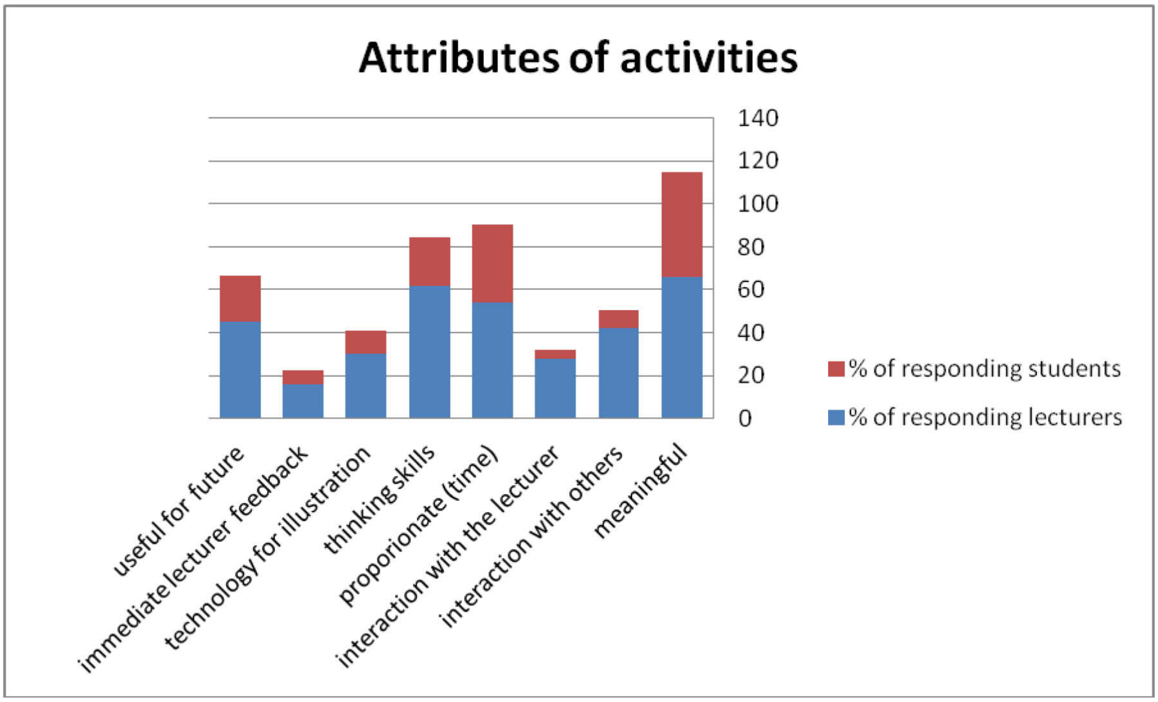

Figure 2.

In the interviews that we conducted students complained about activities that were time consuming because they could not understand what they were required to do. The term *frustration* was repeatedly used in relation to this type of activity. In addition there were activities that were to be performed in groups, however due to lack of knowledge regarding how to collaborate effectively online, they were obliged to conduct face to face meetings in order to do the work

The learning outcomes of the online week

In the results of the previous year, many students noted that they were engaged with actually finishing the activities than with really learning because of the workload: "There was no learning, my main goal was to finish everything on time, and I didn't have much time to really learn…". There were similar statements in this year's feedback. However, the quantitative data from the feedback forms and the qualitative data from interviews that were held in the current year i.e. 2015/2016 showed that the majority of students (71.5%) did not spend more than 4 hours work on the activities, this in comparison with a 6-8 hours of schedule when on-campus. Also, students that were interviewed stated that there was an improvement regarding the workload because the activities were more proportionate in terms of time.

There were three statements regarding learning outcomes on a 5 point Likert scale: learning the material, experiencing innovative learning and experiencing new technological tools. There was a slight increase in of responses to the statement: "I learnt the material well during the online week", between 2014 and 2015 for all students. 15% of the responding students fully agreed with the statement, compared to 9.3% of the students in the previous year.

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The difference between regular and preparatory students was notable on all three statements regarding learning outcomes as can be seen in the following graph.

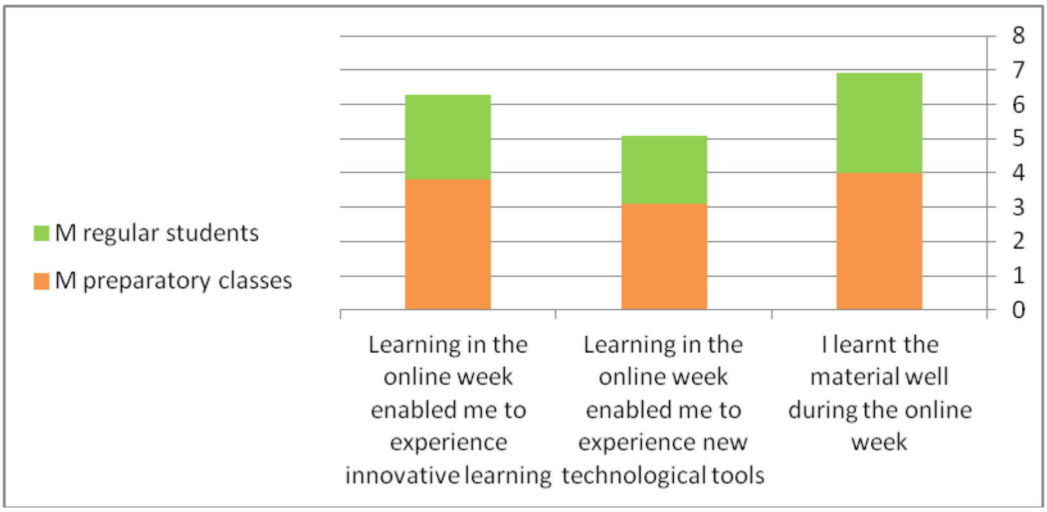

Figure 3.

Discussion

This research dealt with the results of a weeklong practice of sustaining academic activities in a random online short-term environment (ROSE) during short term interruptions due to weather, epidemics, environmental pollution or terror acts. The circumstances of such an environment have much in common with regular online or blended courses. However, we claim that because of its intensity it has unique features in terms of workload and presence of other members of the family, in addition to challenges related to the cause of interruption. This justifies practicing a ROSE in order to formalize a basic plan which could be used by institutions in real-time.

The results referring to preferable activities demonstrate the challenge in convincing students of the efficacy of the online week. It seems that many students do not believe that it is possible to learn new material in such an environment. The research indicates the preference of students to activities that involve media (particularly videos) and those that are aimed at rehearsing material dealt with in face to face meetings. As for attributes of these activities, it is notable that the most important attribute is being meaningful and interesting for the student on a personal level.

An interesting finding regards the different point of view of students and preparatory students. This can be due to attrition but also to the manner in which the head of the division carefully monitored the activities in order to ensure a variety of experiences for the students. No doubt that the role of the head of a department is important in managing a meaningful learning experience. One can argue that during an authentic ROSE the head will not be able to exercise such supervision; however, the fact that instructors have experienced the design of a variety of activities on an annual basis might have a positive effect during real time.

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We infer from responses of the regular students regarding the experience of new technological tools that in fact instructors used a limited number of these. Developing a virtual toolkit containing categories of a limited number of tools that address various pedagogical needs (Bates, 2013) could be of assistance to instructors without overwhelming them, and could deepen their ability to make use of the diverse capabilities of the available technology. It is important to keep in mind that technology is basically a tool not a goal in itself even in an online learning environment.

The discrepancies between instructors and students regarding learning activities demonstrate clearly that we have yet to learn how to narrow the gap between perceptions of instructors and students regarding this issue in a ROSE, although we believe that they are partially related to the fact that the online week is a drill. They also indicate that instructors who are not proficient in teaching in an online environment should receive more training in order to learn how to transform face to face content to meaningful online activities appropriate for a ROSE and to be able to choose technological tools best suited for these activities. Supplying the instructors with an accessible template for planning activities could possibly be of use.

Annual drills could be the key to sustaining meaningful and effective academic continuity during unexpected disruptions of the academic year, and could facilitate the formalization of an institutional plan for effectively dealing with such occurrences.

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SITUATED FORMATIVE FEEDBACK – HOW A MOODLE CAN ENHANCE STUDENT LEARNING THROUGH ONLINE FEEDBACK

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Abstract

This study addresses the conceptual challenge of providing students with good quality feedback to enhance student learning in an online community of practice (COP). The aim of the study is to identify feedback mechanisms in a virtual learning environment (VLE) and to create a full formative feedback episode (FFE) through an online dialogue. The paper argues that dialogue is crucial for student learning and that feedback is not only something the teacher gives to the student. Viewing good quality feedback as social, situated, formative, emphasis is put on the establishment of dialogue. We refer to this type of feedback as, Situated Formative Feedback (SFF). As a basis for exploring, identifying and discussing relevant aspects of SFF the paper analyses qualitative data from a Moodle dialogue. Data are embedded in the qualitative analytic program Nvivo and are analysed with a system theoretical textual analysis method Asynchronous written dialogue from an online master's course at Aalborg University forms the empirical basis of the study. The findings suggests in general that students play an essential role in SFF and that students and educators are equal in the COP, but holds different roles. The students need to take ownership over the learning goals and create a shared understanding of the learning objectives

Introduction

Assessment may be viewed as the only way that we can know whether what has been taught has been learned. Assessment may be seen as the bridge between teaching and learning (Wiliam, 2010). Feedback used in educational contexts is in general considered as essential to increase knowledge and skill acquisition by any learners and feedback is also depicted as a significant factor to dramatically enhance student learning (Black & Wiliam, 1998; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008). Hattie placed feedback among the five most powerful methods that influence student learning and the most critical mediator for many other successful methods of improving student learning. Despite these findings we need to be aware of how little is actually understood about the characteristics and quality of studies regarding feedback. For instance, how do researchers define online feedback? Much of what educators and students do every day may be seen as latent assessment opportunities for collecting evidence of student understanding. Hence this evidence should potentially form the basis for feedback to students (Ruiz-Primo, 2011). Formative feedback may be considered as a process guided by selected learning objectives, where both student and educator are working towards achieving those objectives. This means that an effective formative feedback process ought to clarify the learning outcomes and the criteria to successfully meet the learning objectives. It should also compare the current learning level with the criteria of success and communicate and use the information to move the student from the current performance to the desired performance (Ruiz-Primo & Li, 2013). The formative part of formative feedback is not to be understood as such without connecting it to the learning objectives and compare the students' current performance with the desired performance as criteria of (Ramaprasad, 1983; Sadler, 1989). These feedback activities directly contribute to create high quality assessment. The impact of feedback information is determined by the degree to which the educator is able to fulfil these activities in the virtual learning process.

In this paper, the authors argue that virtual feedback must be seen as a social SFF that never ends, and a new understanding of virtual situated formative feedback is developed.

Towards a definition of situated formative feedback

Black and Wiliam (2009) claim that there are two main functions of feedback: directive and facilitative. The directive feedback tells the learner what needs to be fixed or revised and this sort of feedback tends to be more specific than facilitative feedback. Facilitative feedback provides ideas, suggestions, proposals and comments to help guide learners in their own revision and conceptualization of their learning. Formative feedback is defined as information communicated to the learner intending to modify his or her thinking or behaviour to improve learning (Shute, 2008).

We are inspired by a formative feedback framework developed by (Lukassen, 2016) inspired by Dylan Wiliam (2010) and (Ruiz-Primo & Li, 2013), which reflects an understanding that learning is primarily a social process and that learning cannot be separated from its social context. This framework puts focus on collecting assessment information and offering feedback on the complex teacher-student interactions. A complete assessment cycle must contain four activities:

1. clarifying learning goals;
2. eliciting information to check students' understanding;
3. interpreting the information collected, and
4. acting on the information collected.

The framework lays its focus on interaction and dialogue and emphasizes that educators can benefit from a closer contact to their students and a closer student – student contact. Black (2001) argues that with better interactions, educators will be in closer touch with their students' progress. Students will become more active and responsible as they become involved in expressing their thinking to their educators and their peers. Hence we adopt the concept of learning as being *situated* from the Swiss educational researcher, Etienne Wenger. Wenger's

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theory of learning is basically a social theory Situated learning implies the giving birth to a thought and action that is used appropriately in the right time and context (place).

Situated learning focus on the relation between learning and the social situations in which the learning occurs. In this approach, the content is learned through doing activities and it is dilemma driven. Wenger understands Communities of Practice as "the social fabric of learning" (Wenger, 1998; p.251) and stresses that the mechanism that makes information knowledge empowering (i.e. the very mechanism that makes it *knowledge*) is the way and the extent to which it can be integrated and operationalized within an identity of participation (Murchú & Sorensen, 2004).

Collaborative learning principles call for a perspective and functioning of group learning, while learning through COPs points to learning as an aspect of the functioning of a community of practice. They both accentuate learning as an individual and a social phenomenon, and they both argue for shared, collaborative and democratic learning efforts, stimulated through participation, engagement, motivation, and ownership (Sorensen, 2009; Sorensen, 2010; Murchú & Sorensen, 2003; Sorensen & Takle, 2002). In the learning perspective applied to this study, we view online learning as processes taking place collaboratively in what we identify as online communities of feedback practice. It changes our analytical focus from viewing the COPs as secondary phenomena in a fixed instructional plan to emphasizing the COPs themselves as the curriculum.

The situated formative feedback framework then lays its focus on interaction and dialogue and emphasizes that educators can benefit from a closer contact to their students and a closer student – student contact.

Table 1: Wiliam (2010) visualizes the concept of formative feedback as situated

The Moodle is the centre of all interactions.	Where the learner is going	Where the learner is right now	How to get there
VLE Educator	Clarifying learning intentions and sharing criteria for success in the Moodle	Engineering social online discussions and reflections	Providing directive and facilitative online feedback that moves the learners forward
Peer	Understanding learning intentions and criteria for success	Activating students as socially situated instructional resources for one another	
Student	Understanding learning intentions and criteria for success	Activating students as owners of their own learning, but their thoughts and actions are situatedly shared with the community	

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The student's thoughts and reflections are always situated in the online community of practice. In that way peers and educator can provoke that the students understand the learning intentions.

Description of the master programme

The situated formative feedback is applied to a course in an online master program at Aalborg University. The aim of the program is for the students to achieve theoretical, analytic, methodological, and design competences within the scope of ICT and learning.

The objective of the course is to develop the students' own competences through collaborative and dialogic knowledge construction online, using an assessment criteria framework based on roles, developed by Murchú and Sorensen (2003) and Sorensen (2010). The students are encouraged to be active and engage in the course by contributing to the discussion forums. Before the students engage in the dialogue they will individually study texts and form smaller groups where they will be assigned a role (proposer, opponent, moderator, and commentator) used in the discussion forums. The proposer will initiate the discussion by constructing a problem which enables theory and practice. This will kick off the discussion and actively engage the other group members. The learning goal for this assignment is:

> *"… the students must obtain conceptual knowledge about learning processes that enhances quality, dialog, and cooperation in an CSCL environment." (Sorensen, 2010)*

Throughout the course, Moodle represented the virtual space in witch teachers and students could meet and cooperate. The course in Moodle contained the course syllabus, curriculum, assignments and the discussion forums. Moodle is an open source Learning Management System (LMS)/VLE. Often the terms LMS and VLE are used interchangeably with emphasis on slightly different aspects of the learning process (Weller, 2007). Here we use VLE to stress the notion of being in a virtual environment, but still with the opportunity to learn.

In general, the discussion forum provides a system for organizing messages ordered chronologically and in branches. Messages can hold text, images and other web related content. Communication in a forum is asynchronous giving student's flexibility in time and space to reflect on and articulate their thoughts at their own pace (Pena-Shaff & Nicholls, 2004). The level of social presence in an asynchronous learning network (ALN) may be considered low. Despite this, Computer Mediated Communication (CMC) includes more students by providing an environment for diverse viewpoints and equal participation, offering various ways of communicating using alternative socio-emotional content (Rice, Hiltz & Spencer, 2005).

Didactic decisions form the use of the discussion forum and may have an effect on the student's engagement in the forum. Forums may be both structured and unstructured. One way of structuring a forum could be posting a question that could spark the discussion or

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scaffold the discussion by setting up requirements for the student's participation. In an unstructured forum, the students would have more control, deciding the topic and forming the discussion. Students tend to like both structured and unstructured forums, but they find the structured forum more engaging with respect to the feedback they may receive from an instructor (Salter & Conneely, 2015). In this module, the discussion in the forum is highly structured by the teacher setting roles for participation and giving formative feedback.

Research design and methodology

Our data are qualitative and consist of transcripts from student and educator written interactions (N=120 students) in a Moodle. The underlying analytic approach in this study to construct knowledge uses a three-step radical hermeneutic model for data construction and data analysis. In the radicalization lies a rejection of ontological conceptions. Ontology is the science of the being and the ontological oriented science therefore ask into what exists (Rasmussen, 2004).

This implies that we approach our analysis on the assumption that textual analysis becomes a matter of observing the ways in which the informants (the students), observes in his text. Put more precisely, it is a matter of observing what difference the text applies and designates.

The three steps are in short defined as:

1. *Empirical construction.* In the first step, we read the transcripts with selected differences based on the concept of situated formative feedback. Readings at step one do not occur without assumptions or preconceived ideas. The text is read on the basis of differences selected by the interpreter (us). The reading of a text is not arbitrary; it is based on consciously selected differences. Reading a text based on these differences makes it possible for the interpreter to observe which differences, the text applies in relation to the interpreter's differences. This process is distinguished from a vague observation based on the text's complexity or a completely arbitrary reading (Rasmussen, 2004).
2. *Hypothetical construction.* In step two, it makes no sense to trace the results of the interpretative process back to the text. What kind of certainty would that afford the interpreter? If the results are to be examined further, they must be traced back to the selected designations in the form of differences with a view to observing what lies behind the designations. The result of research and interpretative processes is what has been observed and designated by the researcher as interpreter. Rasmussen will term this designation a hypothetical construction (Rasmussen, 2004).
3. *Reflective construction.* The third step involves an interpretation of these differences taken together. In step three, we can compare different ways of using feedback and identify possibilities and limitation in applying a full formative feedback episode in a Moodle.

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We embed these steps into the qualitative analytic program NVivo 11. This program cannot do the analysis for us but helps us to structure our data through the use of nodes. A node in this study is our selected differences in the empirical construction.

The next section will present our findings separated into these three steps.

Analysis and findings

The empirical findings are divided into three sections. First, we present the empirical construction of data where we present what the selected differences actually apply and designate about SFF. Second, we perform a reflective construction were we analyze the information from the empirical construction. Third, we construct a hypothetical construction and present perspectives based on the reflective construction. These constructions were analyzed with Nvivo and one representative discussion thread is presented. The number of participants are N=8 and number of posts or threads are N=22. In the findings, we present quotes from only representative thread and state the four roles before each quote: The proposer, the opponent, the moderator and the commentator (educator).

Empirical construction

According to the assessment cycle, the following four differences are selected: Learning goal, eliciting information, interpreting the collected information and acting on this information. Here we identify and explore our discussion thread for these differences and select a specific discussion for further analysis.

Clarifying learning goal

In the online discussion, the learning goal is addressed in the first paragraph by the *proposer*:

> *"… how is the Danish compulsory school ready to us the ICT opportunities and new educational- didactic opportunities related to collaborative online learning?"*

Eliciting information to check student understanding

After referring to the theory provided in the VLE the proposer elicits information about personal experience with the theme:

> *"I have experienced how pedagogical and didactic with online educational resources and the use of ICT have been neglected because of the technical challenges. Instead of promoting the didactic advantages, it suddenly turns into technical tutorials".*

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Interpreting the information collected

Based on the initial post by the proposer one of the opponent's reply by interpreting information from the proposer:

> *"My experience is that many online educational resources are challenged by the lack of evaluation tools that support the students in their own self-evaluation."*

And the opponent ends with the post by asking the question:

> *"…So the counterargument would be: Are the online educational resources ready for giving the best possible space for discussions between students and teachers about the students learning?"*

Acting on the information collected

After the first two posts in the thread, the educator sums up both the elicited and interpreted information:

> *"Interesting discussion about online educational resources and if they can support CSCL (ed: collaborative learning). And also on the teaches missing insight into the didactic possibilities in ICT."*

And educator asks question for further reflections:

> *"… with the use of online educational resources… do they take into consideration the students learning outcome? Is it good teaching and will the students gain from this?"*

Hypothetical construction

Based on the empirical construction the hypothetical construction will be created. We build on the presented definition of situated formative feedback, which lays its focus on interaction and dialogue in a COP. The section is structured on the three categories in Fig. 1: Where the learner is going, where the learner is right now, and how to get there.

Where the learner is going

In a COP learning is both and individual and a social phenomenon and they both argue for shared and collaboration efforts. Based on the empirical construction we recognize that the learning goal no longer a goal only owned and determined by the educator. During the elicited and interpreted information, the learning goal is shared in the COP and every role in the discussion takes on an ownership of the goal. The discussion forum facilitates a new way to share understandings and meanings regarding to a specific goal. These divergent understandings of the initially presented learning goal follow the discussion thread through

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the whole discussion. The learners (e.g. the proposer, the opponent & the moderator) move on in a collaboration community with new shared understandings of the learning goal.

These collaborate, shared and basically moderated learning goals give a foundation to identify where the learner is in the social learning process.

Where the learner is right now

In the discussion thread, the opponent responds on the initial post by reformulating what the proposer already had been expressing. The students constantly activate their shared understanding and therefore act as socially situated instructional resources for one another. This creates a solid foundation for making the feedback situated in the COP.

In the same way as the opponent, the educator (commenter) supports the shared understanding in the discussion thread by addressing the theme and calls for ongoing discussion. The educator recognizes the peer feedback as equally important as her own. Feedback is therefore viewed as shared in the COP.

How to get there

The educator sums up the learners perspectives in her own words and provides relevant feedback at the proper level by referring to earlier student perspectives and makes the feedback situated. The educator shows that she actually has read the students perspectives. The proper level is defined as feedback that is provided at the same level as the learners. An example; when the proposer reflects on practical experiences regarding the use of iPads in middle school and the educator provides feedback that follows up this practical path. Another example; where a student links theory with practice and the educator follows up this connection by proposing another theoretical concept from George Siemens that could additionally help the learner towards new levels of insights. In our definition of SFF we mentioned two aspects of feedback; Directive and facilitative. In our study, the educator lacks to provide any directive feedback. We only identify facilitative feedback. Our study lacks to identify any reasons of this. But we contemplate a concrete reason could be in the aspect of a delayed timeframe from a learners reflection to a peer or educators feedback. Directive feedback can be perceived harsh or inappropriate for the learner and could end up offending the learner. The Moodle does not support an instant chat- function and our study shows that there sometimes was more than a day from an initiated reflection to any given feedback. From this notion, it is safer to use facilitative feedback – at the proper level.

Reflective construction

The empirical and hypothetical construction gives us insight in how the notion of SFF could be applied in a Moodle. It is not in the scope of this paper thoroughly to explore all opportunities and limitations to work with the concept of SFF and to perform a full FFE at all time. We conclude this paper with a hypothetical construction; as recommendations for future teaching practice.

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Recommendations for future use of SFF:

1. Students play an essential role in SFF.
2. Students and educators are equal in the COP, but holds different roles.
3. The educator needs to design online learning so learners can work and participate in groups.
4. Feedback only provided by the educator is not necessarily formative feedback. It must be situated in the shared COP.
5. Learning goals can be modified (if the current exam form calls for reflection and not essentially direct answers).
6. The students need to take ownership over the learning goals and create a shared understanding of the learning objectives…
7. A VLE may not be the proper place to use directive feedback.
8. Timing of feedback. Educators, peers and learners need to engage in the VLE discussion every day.
9. Students need to accept the shift in roles and that they need to take great responsibility in their own learning process.

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EXAMINATION OF THE EFFECTIVENESS OF ELECTRONIC LEARNING ENVIRONMENTS

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Importance of impact assessment report on e-learning / e-teaching

The e-learning tools play a major role in supporting the individual learning processes and its efficiency (Green et al., 2010). However, the concept of these environments has a broad spectrum, it encompasses a variety of online platforms, applications, and virtual spaces. Nowadays educational science research focuses on the efficiency of e-learning and on the appropriateness of its methods. In a significant part of the domestic and international researches the researchers (Palfrey & Gasser, 2008; Prensky, 2005; Tapscott, 2009) analyse the adequacy of the electronic methodological device (content and format of the curriculum). In other parts, examining the connections of the different forms of course organization (e-learning, blended-learning, classic-learning, virtual-learning) and the students' characteristics (age, lifestyle, learning patterns, technological knowledge) the researchers are trying to prove or disprove the adequacy of the e-learning environments for the students. (Ollé & Csekő, 2004; Benson, 2005; Rønning, 2007; Cygman, 2010)

In the Hungarian higher education e-learning/e-teaching environments are typically realized in online learning management systems. In my research I proceed from the model and research toolkit of the *man-machine-environment* ergonomic system, and I use student and learning characteristics and concepts of learning environment used in the educational science (Kálmán, 2009). The objective of the research is to identify the characteristics that affect the efficiency of learning in e-learning/e-teaching environments.

This research explores learning management methods in online learning environments that are most frequently used in the national higher education and analyses the students' different learning specialties, customs and efficiency. Analysing the differences of the environments and the students based on these characteristics I make an attempt to create a model determining the efficiency of e-learning environments.

Concept of the research

The basic idea of the research is given by the *added pedagogical value model* expressing the efficiency of traditional school environments (Balázsi & Zempléni, 2004). I assumed that after a proper adaptation the model can also be used to evaluate e-learning environments. Therefore I developed a new model based on Kálmán's (2009) model which I expanded with the characteristics of e-learning environments and with the students' characteristics related to online learning (Figure 1). The analysis of the relationships between elements of the model is competent to determine which students' and learning characteristics or which learning environment characteristics influence the result of learning. Former research results suggested that the learning characteristics used in traditional learning environments need to be completed with elements of online learning attitude in electronic environments to define the online learning pattern.

To characterize the various e-learning management environments I created a system of evaluation criteria that also considers the standards of designing the e-learning platforms beyond the recommendations of the above mentioned researches. Based on the ergonomic principles of ISO 10075-1 (2001) standard related to mental workload, on the characteristics of ISO/IEC 9126 (2001) standard and the new version of it, ISO 25010 (2011) standard defining the software quality as well as on the ISO 9241-11 (1998) standard defining the usability aspects of e-learning courses I summarized the system of quality and usability aspects concerning the user platform of learning environments. To compare the functional characteristics of learning environments I primarily considered the learning management concepts of Komenczi (2009) and the aspects of Allen (2011) to design the learning platform. I identified the result of learning with the concept of performance achieved by students in e-learning management environments which made it possible to compare the results achieved in different environments in a normalized form (using performance points in percentage). I used the model on the Figure 1 for course-level assessment, and the components are also suitable for course-level characterizations.

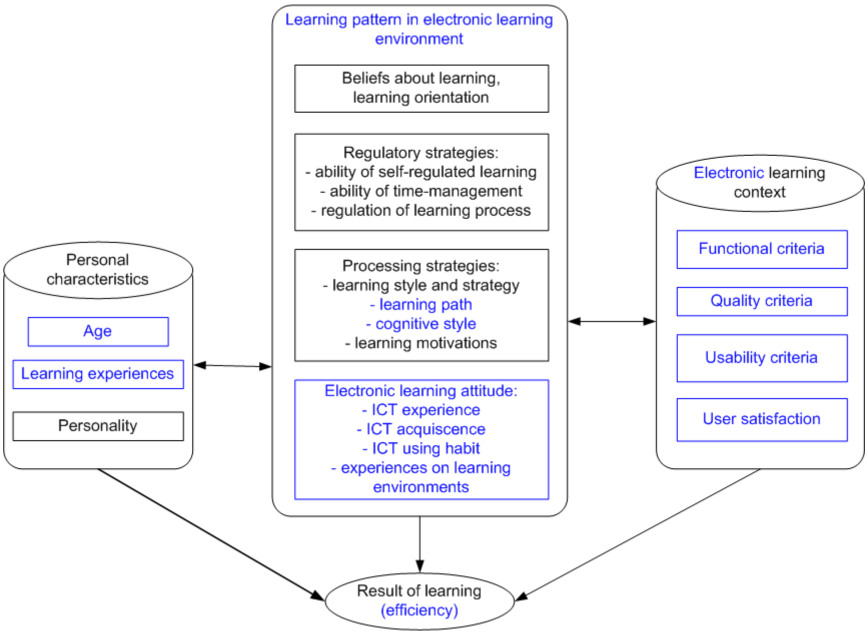

Figure 1. Elements of the online added value model (based on Kálmán (2009), my own figure)

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Main questions and hypotheses of the research

1. I assume that in courses based on different learning management principles different levels of performance can be measured; in courses with higher activities and with guided learning process the students' performances are higher. The hypothesis is based on that statement according to that the learning management principles of the content-driven and action-oriented subjects are different, the required learning activity is accordingly different (Komenczi, 2009). The degree of directionality can be also different in each course, and according to studies of Ollé and Csekő (2004), these two characteristics have an effect on the students' efficiency. In my study I intend to identify the types of sample courses and to compare these types of courses with the efficiency of the students. (H1)
2. I assume that from the learning characteristics the student's ICT experience and his attitude related to online learning primarily affect the student's efficiency in an e-learning environment; i.e. those students who have more ICT-experience and positive ICT-attitude or their efficiency is not affected by the design of the learning environment are more efficient. In former researches was shown that student's *brought* learning characteristics (personality traits, attitudes and patterns of learning), their ICT-experience and the learning efficiency are related characteristics. (Benson, 2005) (H2)
3. In a given learning environment the expected success of the students can be predicted if the students' online learning characteristics and performance data are known; so based on the available amount of data the students' expected performance can be reliably estimated from their learning characteristics. Therefore I assume that in the e-learning environment the students' expected performance can be predicted based on their online learning characteristics (their so-called *online brought value*). (H3)

Methods, tools, process and participants of the research

I used data of log files about 35 courses and their participants from 5 Hungarian higher education institutions. Based on the students' list of these courses I could analyse the online learning activities of 3147 participants in the database files. The courses were implemented in Learning Content Management Systems (LCMS), in Moodle. By collecting students' data I used online questionnaire and I could work with raw data in a form of course information and activity data of log files; by assessing the data I used statistical and data mining methods. During the evaluation of the results, the analysis of the hypotheses I worked with SPSS Statistics 19.0 and SPSS Modeler 15.0.

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Based on the evaluation criteria system described before I compared the platforms. Courses could be classified into four categories of the degree of the directionality of learning, the quantity and variety of required activities such as the major clustering features. In each course category I defined the typical learning patterns by analysing the data of the log files.

To identify the students' learning characteristics I used online questionnaire which first I tried out on a sample that included 106 students of 5 courses from 3 educational institutions and validated the issue groups. The questionnaire was finally completed by totally 826 students of 23 courses from 5 educational institutions (769 of which were completely filled out). With help of the questionnaire I created online student type categories, first just to identify the attitude and the motivations related to online learning; and later I expanded this category feature with students' characteristics that is supposed to be suitable to determine the „online brought value".

Hypotheses in the light of the results

The analysed sample did not proved that the highly required activity and the strongly guided learning process can lead to high performance. On the analysed sample the students' highest performances were measured in the partially guided and moderately active courses (requiring not regular but more than one online activity) and I experienced the students' lowest performances in the guided courses requiring a regular online activity. (H1 is rejected).

I also reject the hypothesis H2 because no significant difference can be demonstrated between the performances of the groups based on the students' online learning attitudes on the analysed sample. However, knowing the results of the attitude groups measured in different learning environments I assume relationships between the types of learning environments and the learning characteristics to determine the students' online learning attitude; further analyses are needed to prove this. Further research results show that students with a negative attitude have better grades, but their online learning management competency is weak. Students with a neutral and positive attitude have less good grades, but they were motivated and their learning management competency was efficient, according to the answers of the questionnaire they filled in. According to these results I conclude that the *positive* attitude really means online learning and in those environments these students are successful where the online learning activity actually gets place. Students with a *neutral* attitude can accept both forms of learning, the virtual and personal presence and they accomplish the theoretical and practical subjects equally well.

In hypothesis H3 I tried to adapt the pedagogical added value model for traditional learning environment into online one. To determine the relationship of online learning characteristics and learning efficiency I used factor analysis with 14 different variables of the online learning characteristics in order to create a feature (online brought value index) compacting online learning characteristics which can be suitable to predict their performance on the level of individuals. Due to their number and their low explanatory power the factors were not competent for expressing the students' online brought value index with help of the factor points identified by the factor analysis, i.e. I could not generate generalizable index values from them. Therefore I ignored to determine the index value but I tried to find answers to that which students' characteristics have what kind of impact on the efficiency of learning in the analysed sample. Therefore additional factor analyses were carried out on different sub-samples (grouping categories: learning environment experience, online learning attitude, performance, student type, age, gender). The identified 4-5 factors were the following:

- The 1st and 2nd factors compacted the student characteristics favouring the radical and superficial learning method that were dominant features of the student type categories (*willingness to accomplish* and *willingness to know*).
- In the 3rd and 4th factors the personality traits and the cognitive style notes appeared in general. In the sample the students with introverted and field-dependent characteristics proved themselves to be more efficient in the analysed e-learning environments which result were demonstrated in the researches of other researchers (Palloff & Pratt, 2002).
- In the weakest factors (4th and 5th) the learning management, the self-management and the time management competencies appeared. If these are positive and efficient the students typically achieved a better performance.

I could not prove the hypothesis H3 based on the analysed sample that knowing the properly selected online learning characteristics the students' performance can be predicted. From the factors developed to the online version of the traditional model to define the online brought value index was failed due to the normality problems of the analysed sample.

Conclusions, practical use of the results

The objective of my research was to develop a model suitable to measure the efficiency of e-learning environments. Based on the analysed sample I could not prove the general applicability of my *online added value model*. The hypotheses assumed relationships between certain components of my extended model. During the analyses I could prove only partial results due to deficits of the sample and I could create further analysis criteria.

But, as a result of the research I could conclude characteristics of learning environments that positively influence the students' efficiency:

- If the learning process is only partially guided (there is a recommended learning path and schedule but the students may differ from this) and
- among the required learning activities the number of compulsory tasks is low and their accomplishment is not bound to regular periodic deadlines.

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Regarding the analysed sample I could identify three personal factors that influence the efficiency of learning:

- learning orientation and the related learning strategies,
- personality traits and the related information processing strategies,
- learning management and time management competencies.

I think that based on the experiences of this research the typical adequacy of the online brought value becomes controllable on a sample with at least similar number of elements or bigger and fitted to the normality criterion and the identifyability of the index number of the online brought value can be re-examined.

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THE INTEGRATION OF INFORMATION LITERACY SKILLS INTO THE CURRICULUM

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Abstract

This paper will discuss the conclusions of the evaluation for the Information Literacy Skills Modules that were integrated into the curriculum of five online Early-European History undergraduate self-paced courses, offered at Athabasca University (AU). The Skills Modules were incorporated to address serious academic integrity issues students have been struggling with. The modules were designed with the view of improving students' research skills, informing students how to avoid plagiarism, raising their awareness of the rigorous principles of academic integrity, and complete their research assignments successfully. The Skills Modules are taken by students in parallel to the course content and are strategically linked to research assignments. Students' knowledge acquired in the Modules is evaluated by automated online quizzes. In the research assignments students are expected to transfer, apply and demonstrate the information literacy skills learned in the Skills Modules. Through this exploratory survey we learned about students' perceptions and how the Skills Modules assist them on conducting and completing their research paper assignments. Last year, a poster with preliminary findings was presented and discussed at the EDEN –Barcelona conference (Guadarrama, et al., 2015). After 2 years of data collection, the final evaluation report discusses how to enhance the design of the Information Literacy Modules and their curriculum integration in History and Humanities courses based on students' views and perceptions, results obtained by students in their assignments, and the final marks obtained by students in the History courses. This discussion also integrates the course coordinator and tutors perceptions about the Skills Modules based on their teaching experience having the Skills Modules embedded in courses. The results will be disseminated at AU, and national and international conferences with the view of improving course design practices. The evaluation results aim to assist professors looking for solutions to address academic integrity issues in courses where students are expected to write research papers.

The problem

For a long time, professors and tutors have been complaining about students' performance when it comes to writing research papers. Unfortunately, many students are not fully aware of the rigorous principles of academic integrity. As in other humanities and social science courses, many students in history-type courses tend to perform poorly because many have not sufficiently mastered the IL skills they need to complete research assignments satisfactorily. In fact, some are unfamiliar with the study of history at a university level, and others have undeveloped research and writing skills. There is a strong indication that the lack of IL skills not only limits students' performance and learning but also results in academic misconduct, such as cheating and plagiarism. Instructors report they have tried various preventive and remedial measures hopping to enhance students' performance and alleviate their frustrations. However, none of these measures have provided a satisfactory solution. The integration of Information Literacy Skills into the curriculum seems to be a successful solution, though, to this long-term problem.

The solution adopted – The integration of IL skills into the curriculum of history courses

To address students' lack of information literacy (IL) skills, IL skills modules were integrated into the curriculum of five history courses to assist students in producing their assignments satisfactorily, improving their performance, and avoiding academic misconduct and plagiarism. Keeping in mind past practices, a multidisciplinary group (a librarian, an editor, and a learning designer, the course coordinator) got together with the course coordinator to assess the context, discuss previous experiences, and determine a better and more effective solution. Then, instruction was designed, the skills modules were documented, and learning materials were designed and developed. After that, the skills modules were integrated into history courses, along the study guide and strategically connected to the work students have to produce, the criteria they have to meet, and the expectations they have to satisfy to complete their assignments. Since experience has shown that students tend to avoid non-credit materials (library tutorials, style guides, abstract written instructions, etc.), the skills modules were linked to credit assignments so students could not ignore them. First, automated quizzes were designed to reward students' knowledge acquired in the skills modules without creating extra work for tutors. Secondly, the skills modules were made explicit in the instructions, rubrics, and evaluation criteria for assignments which break down the process to complete research papers. Last but not least, the skills modules were reflected in directions and instructions for final exams, which include essay questions. Students have been taking the Skill Modules for more than two years and results show that the strategy is effective and working well for students. Students have welcomed the strategy positively.

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Learning Units (Course Content)	Assignments	Information Literacy Skills Students need for assignments
1 Introduction to Course 2 Ancient Greece	**Assignment 1:** Review of a Scholarly Article • Select from one of 3 scholarly articles about Early Middle Ages • Critically read the essay • Write a report analyzing and appraising the article following detailed instructions • Use library search tools to find at least 3 more writings by the article's author	**Skills Module 1: Library Research Skills** •Identifying scholarly writings: books and articles •Searching AU's online library catalog •Searching AU's online journal databases •Research exercises
3 Ancient Rome		Quiz 1: Library Research • Prepares students for written assignment
4 Post-Roman Europe 5 Early Middle Ages		**Skills Module 2: Reading Scholarly articles** •Critically reading a scholarly essay •Recognizing a scholarly essay •Analyzing its parts •Following a historical argument in a scholarly essay •Appraising essays •Prepares for Assignment 1 and 3
6 High Middle Ages 7 Middle Ages II	**Assignment 2:** Essay Plan and Proposed Bibliography • Chose from among the assigned research paper topics • Write a 1 page essay proposal • Attach a bibliography of 6 or more scholarly books or articles • Indicate how the items were found	Skills Module 3: Chicago-Style Documentation •Reason for documentation •When to cite •Using the Chicago-Style •Documentation exercises
8 Late Middle Ages		Quiz 2: Documentation Quiz •Prepares for Research Essay (Assignments. 2 and 3)
9 Renaissance and Reformation		Skills Module 4: Organizing a History Essay •Purpose of essay assignments •Features of essays •History Essay Elements (No quiz: prepare for Research Assignment 3 and final Exam)
10 States and Capitalism	**Assignment 3:** A research essay in response the student's choice of topics from a list of assigned questions. • Must use at least 4 scholarly books and/or articles Must use Chicago-Style documentation • Must conform to History essay norms • Must avoid plagiarism	Skills Module 5: Using Evidence in a History Essay When and how to •summarize •paraphrase •and quote
11 Wars of Religion		Quiz 3: Using Evidence •Prepares for Assignment 3 (Research Essay)
12 Absolutism and the Limits of Early Modernity		Skills Module 6: Academic Integrity: Avoiding Plagiarism •Avoiding Plagiarism •Common Questions about Plagiarism •Detecting Plagiarism •Mastering the Techniques for Giving Fair Credit
		Quiz 4: Academic integrity •Prepares for Assignment 3 (Research Essay)

Figure 1. Example of the Integration of Information Literacy Skills into the curriculum: History 215: Europe: Ancient to Early Modern: Course Map

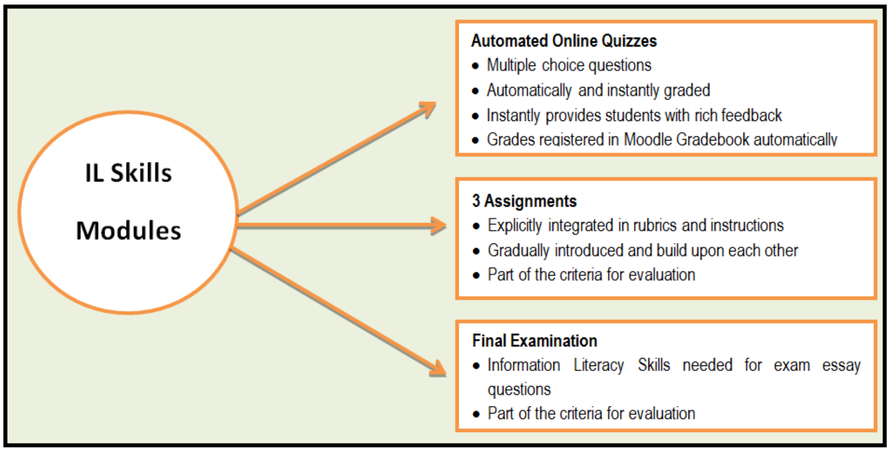

Figure 2. ILSs modules are not 'optional' materials ignored by students. The Skills Modules are evaluated in three different ways

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Theoretical Framework

The Information Literacy Competency Standards for Higher Education (ACRL, 2000) framework was adopted to design the Information Literacy Skills instruction and integrate them into the curriculum of history courses. It became clearer that a new attempt to enhance students' performance needed the information literacy skills instruction aligned to learning activities, assignments, and evaluations. The information literacy skills modules were integrated keeping in mind how the ACRL defines that "an information literate is able to:

- Determine the extent of information needed,
- Access the needed information effectively and efficiently,
- Evaluate information and its sources critically,
- Incorporate selected information into one's knowledge base,
- Use information effectively to accomplish a specific purpose,
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally." (ACRL, 2000).

Methodology

Purpose and Significance of the Study

The main purpose of this evaluation is to inform course design practices at AU. It is important for AU's academic community to learn how the Skills Modules strategy works for students, if it works in the way it was planned, if it needs to be enhanced and how, and if it brings unintended benefits that may have arisen. Based on students' perceptions, it is expected the findings would shed light on how to make the modules as effective as possible for them. This evaluation intends to inform course design practices across AU faculties. It is expected the findings will be disseminated in the AU academic community with the view of enhancing course design practices. Other academics may find the Skills Modules suitable for their students and may want to adapt them into their own courses. Beyond AU, we intend to disseminate the findings in national and international conferences to discuss the Skills Modules with academics in other institutions, who may be facing the same issues. We intend to publish in national and/or international academic journals. Also, we intend to release the Information Literacy Skills Modules to the public under a creative commons license so that anyone in the public could use/adapt them in their own courses.

Delimitations of the Study

This study involves the following undergrad, online, self-paced, individualized three-credits courses:

- History 215: Europe: Ancient to Early Modern;
- History 371: Early Medieval Europe: 400–1000 (Rev. A2);
- Humanities 312/ Classics 312/ History 312: Ancient Rome (Rev. C1);
- Humanities 313/History 313/Religious Studies 313: Early Christians (Rev. C1);

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- History 383: The Vikings (Rev. C1).

The Information Literacy Skills modules integrated in the above courses are focused on Chicago Style for students who are conducting research in the field of history. The modules have been adapted for other styles.

The five history courses may get 130 students a year. Students have 6 months to complete the course. Since the survey is only available to students until they submit the last assignment in the course, data is coming in slowly.

The survey

A survey was designed to collect data about students' perceptions concerning the use of the information literacy skills in their courses. The focus for this exploratory non-experimental survey is to gather information from students about how the IL skills modules assist them on:

- improving their performance while completing their research assignments;
- searching for academic sources;
- identifying peer-reviewed scholarly articles;
- distinguishing between primary and secondary sources of information;
- organizing and writing their research papers;
- quoting and referencing properly their sources of information;
- using Chicago style properly;
- avoiding plagiarism;
- applying the academic integrity principles in their work.

How the survey was integrated?

The survey was designed in such a way that its sections reflect the research process students have to go through to complete their research assignments. The organization and sequence of the survey reflects the one in the skills modules. Both, the ACRL framework and the skills modules were used to design the questions of the survey. The organization, the sequence and questions of the survey may facilitate students recalling their experience while answering the survey.

To increase the reliability of the survey, it was reviewed and enhanced by a multidisciplinary group integrated by the acting director, AU Library Services, the coordinator of the history courses, by other AU researchers, and by AU learning designers who have a wide experience in educational research. The same group of experts also participated in the design of the skills modules.

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Evaluation Core Questions:

- To what extent do students perceive their performance improve because of the IL skills standards integrated into the curriculum of history courses?
- What are students' perceptions of the Skills Modules?
- To what extent do students think the IL skills modules inform them on using the library efficiently?
- To what extent do students consider the IL skills modules improve their understanding for completing their assignments?
- To what extent do students estimate the ISLs modules guide them to adhere to principles of intellectual integrity?

Participants

All students who complete the last assignment are invited to complete the survey. After submitting the last assignment, an invitation and a link for students to access the survey become available. Students who decide to participate complete the survey after submitting the last assignment and before getting their final mark. Participation is on voluntary basis and completely anonymous.

Data collection

The survey is still available for students since August 2014 and will be available at least until April 2015.

Reporting the findings

The final evaluation report will be presented to the AU community with the view of enhancing course design practices. Internal dissemination of the findings will first occur among other AU subject matter experts, course coordinators, and designers at the institutional level. Results will be presented to the AU community through workshops and lectures. It is anticipated that findings and results will be also presented in national and international conferences and published in academic journals.

Data Analysis: The survey is still in place and data continue being collected until May 2016. The findings come from the answers of respondents and reflect the tendencies found in the data. In the survey it was used a 1 – 5 Likert where 1 (*strongly disagree*) and 5 (*strongly agree*). The final report will include the analysis quantitative and qualitative data.

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RE-IMAGINING COURSEWORK MASTERS FOR ONLINE LEARNING BASED ON RESEARCH AND DESIGN PRINCIPLES

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Introduction

There are many reasons why courses at all educational levels are moving partly or entirely online. Contact higher education institutions are embracing blended learning as state of the art, but are cautious to embark on fully online offerings due to a present student base that prefer personal contact with lecturers and peers. But expectations from society are changing. Distance learning, with the exception of teacher qualifications, was previously restricted to one South African institution. Changes in legislation regarding distance education in 2014, is having far-reaching implications for residential universities. The University of Pretoria with about 50,000 contact students, has decided to embark on *hybrid delivery* of courses in order to reach more people, from more places. As blended learning using the Blackboard Learn course management system (CMS) is currently widely implemented, it was deemed quite feasible to increase the online components of courses and eventually delivering them fully online.

The best candidates for hybrid and fully online course delivery at our University were identified as coursework Masters (CWM), because descriptions in the local Qualifications Framework authority allowed a change in delivery mode without re-application for accreditation. With the help of Analytics for Learn, a number of Masters programmes with coursework modules in addition to the dissertation, that are already being delivered in blended mode, were identified as low-hanging fruit, and thus ready for re-imagining as eventual online, distance -delivered programmes.

Design principles

The Community of Inquiry (CoI)

Our University has been using the CoI framework (Athabasca University, n.d.; Garrison, Anderson, & Archer, 2001) in workshops for designing blended learning courses as it supports exemplary course design in a constructivist online learning environment. It will be used to inform the design of new online courses. The CoI questionnaire (Arbaugh et al., 2008) will be used to evaluate the quality of post-graduate courses before intervening, and evaluate them after redesign. The three presences of the CoI will be used as framework for interpreting data collected during the analysis and informing design decisions.

ADDIE – Design process

We decided to base the management of CWM redesign on the 5 stages of the non-linear version of the well-known ADDIE process, as shown in Figure 1. In an initial interview with course coordinators planning to re-imagine their courses, we first determined their vision for a redesigned programme and where they currently were in terms of technology use. Concerns and barriers to fuller implementation of technology and institutional processes or policies that hindered distance roll-out, were documented and communicated with the responsible stakeholders. Based on that interview we positioned each course on the ADDIE diagram and planned accordingly. Anne Bartlett-Bragg (Tracey, 2014) and Clark (n.d.) emphasise the importance of using a user-centred design approach for designing integrated eLearning for post-graduate programmes. The first aspect of the analysis consisted of unpacking envisaged course objectives, in order to improve the design of learning interventions to fit the context. Course coordinators were the main subject matter experts (Clark, n.d.) to define and update course objectives. As technology components in blended learning varied, the bottom line had to be established. We had to understand the profile of students representing "those affected" (Clark, n.d.) and how they are using different types of technology, also for learning. The profile of low-technology users would inform the design of pre-course orientation, training and support (Pintz & Posey, 2013).

The starting point for programmes that were already immersed in technology, was the Evaluation phase. Through the Community of Inquiry instrument, Bb for Learn course analytics and open-ended feedback from working students who have completed their studies, it was possible to identify Exemplary Performers (Clark, n.d.), who could be used as role models to help inform the design of other courses. For purposes of appreciative inquiry research, some exemplary courses also completed the ICT questionnaire.

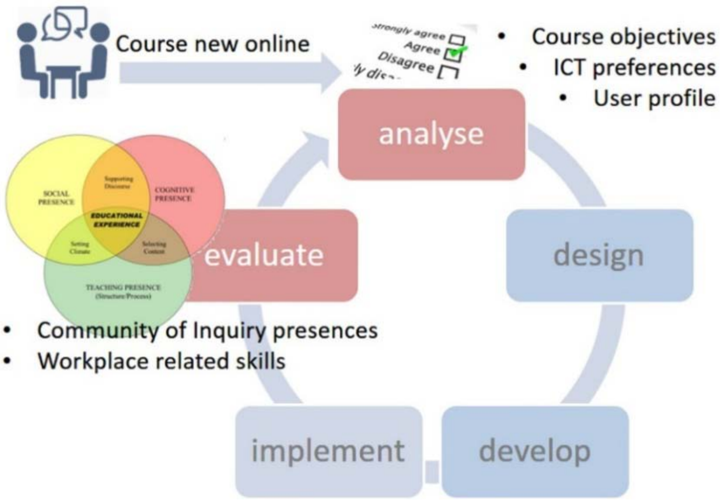

Figure 1. The ADDIE process as followed with CWM

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Methodology

Research instruments

The CoI instrument that was administered in established courses consists of 34 statements that are rated along a 5-point Likert scale that represent the three presences, namely Teaching, Social and Cognitive. Only a pooled overview of CoI averages is given here to triangulate with the ICT findings. In courses calling for drastic renewal of delivery and curriculum, the student ICT use and preference instrument was deployed. The ICT instrument specifically for post-graduate students, is still under development with UNISA and Waikato Universities. The latest version consisted of 23 questions, most of which were in a table-format containing up to 20 sub-items with multiple choice, multiple response or scaled selections. Some questions, like the learning technology use in courses (reported in this paper) provided a usage frequency scale as well as an option *wish for using more*. In principle, the amount of reading to complete the questionnaire was reduced as much as possible, so students could complete it in about 10 minutes. For each group, questions were added or omitted as requested by the course coordinator, but all included some basic demographic items and open-ended text response items. Links to their questionnaire in the Qualtrics© survey tool were posted in announcements from the CMS to be delivered to student email on their mobile devices whence they could directly complete the questions. In order to protect the identity of staff, findings from different courses in the same Faculty or Department were pooled and reported as such. Research Methodology modules were used to distribute the surveys. Response rates varied in the order of 30-60%.

Findings and Discussion

Table 1: Respondent demographics from three Faculties

Faculty or School	Programme	n	Avg age	Full-time Job %	Lap-top for study%	Smart-phone %	%students who study on e-device per week: Hours 1-5	6-10	11-20	21+	% students who study online @ locations: home	campus	work
Edu	Dissertation	44	30	61	86	70	16	27	18	39	82	39	45
Built	Coursework	11	35	100	92	55	18	27	18	36	100	18	64
EMS	Coursework	15	33	100	87	47	7	47	33	14	60	7	67

Due to limited supervision capacity for dissertations, most CWM programmes are limiting enrolments to 12-30 students per intake. The Masters in Education serves the whole Faculty, with about 80 candidates. Their ages varied from under 25 to 50. Their profile differed considerably from fulltime undergraduate students. CWM students were all in full-time professions and many were taking time off from work to attend contact block sessions, some travelling large distances, lending impetus to the drive for more site-independent learning activities. How their profession and the type of post-grad degree they were taking (Education dissertation or CWM in Economic and Management Sciences or the Built Environment) would influence study time, had to be ascertained, as well as their proficiency and preferences regarding ICT for study.

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More than 85% of PG students regularly use a laptop for their studies, while about half of CWM and 70% of Dissertation students made significant use of their smartphones for studies. Students who were not working full-time seemed to have a more mobile learning style, as seen in higher smartphone use and incidence of using on-campus facilities. This confirms findings by Anne Bartlett-Bragg (2014) that post-graduate studying professionals use mobile devices much more than course designers had anticipated. Similarly, we observed that full-time working students used more time at work for their studies than the dissertation students, and are vulnerable to the demands of the workplace that, as reported by Bartlett-Bragg (2014), may take priority above studies, limiting the time available for study during the day. Many EMS students mentioned that they preferred to do online studies after hours at the office, hence only 67% studied at home. Construction students, who are less desk-bound, all studied at home, while 64% also studied at work. The findings from these questions suggest different patterns of engagement in different types of courses that depend on students' work/study arrangements. These factors should inform design decisions that make optimal use of students' available time, like scheduling deadlines.

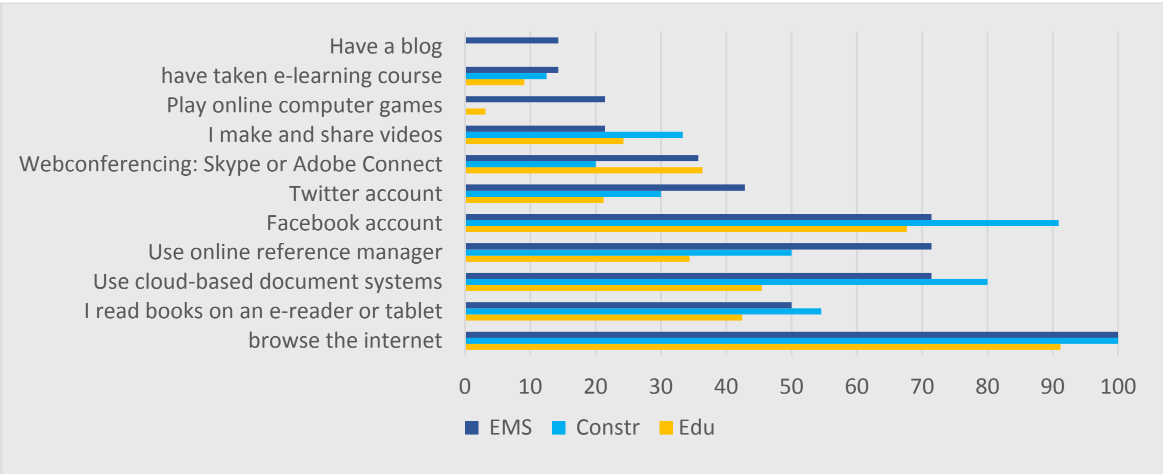

Figure 2. Students' general use of ICT

The use of certain ICT tools in Figure 2 were sorted from the top and grouped according their use in collaborative activities (1-7) or content access. The top 7 items (blog to Facebook) show that while Facebook is clearly the preferred social media platform, less than 50% of students generally use ICT for other social and collaborative activities. The next two items show students' use of ICT for organising their content, including online reference managers, like Mendeley and Endnote, that have been used in some programmes. Half the students read on e-readers, while practically all browse the internet for content and applications. For course design purposes, web-based content and activities will be familiar, and students should be able to negotiate some social networking tools. Some education students seemed less skilled in organising their content using ICT, and might be slightly less skilled using ICT. They would need more training and help with a reference manager and organising and creating content.

The CMS use profile of the previous cohort taking these programmes, provided a baseline for designing further interventions and orientation. The CoI framework was used as lens to interpret the learning implications of findings from the ICT survey. Findings were grouped

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according to how they can support the CoI framework. Figures 3 to 5 show which functions students from the three faculties have been exposed to. The lighter shade of each identifying colour indicates how many students would like to make more use of those tools.

Figure 3 shows how often online learning applications that can contribute to design and organisation under the Teaching Presence in the Community of Inquiry framework, have been used. Where less than 50% of students in a Faculty indicated the use of a tool, it is circled, a blue arrow indicates low use in 2 faculties and a blue arrow. The first 8 items (down to audio clips) represent resources and learning content that, in a blended environment, supplement lectures and seminar-type discussions. It is clear that courses used video clips, lecture recordings and audio clips differently. Education students wished to revisit seminars more than the other students. Presenting a course fully online would require content to be presented in different formats, as some students prefer listening to reading, and understand content better when watching a video (Sams & Bergmann, 2013). Except for one module where some lectures were recorded, the others might consider the presentation of lectures in different media like video, or adopting a flipped learning format (Kellogg, 2008).

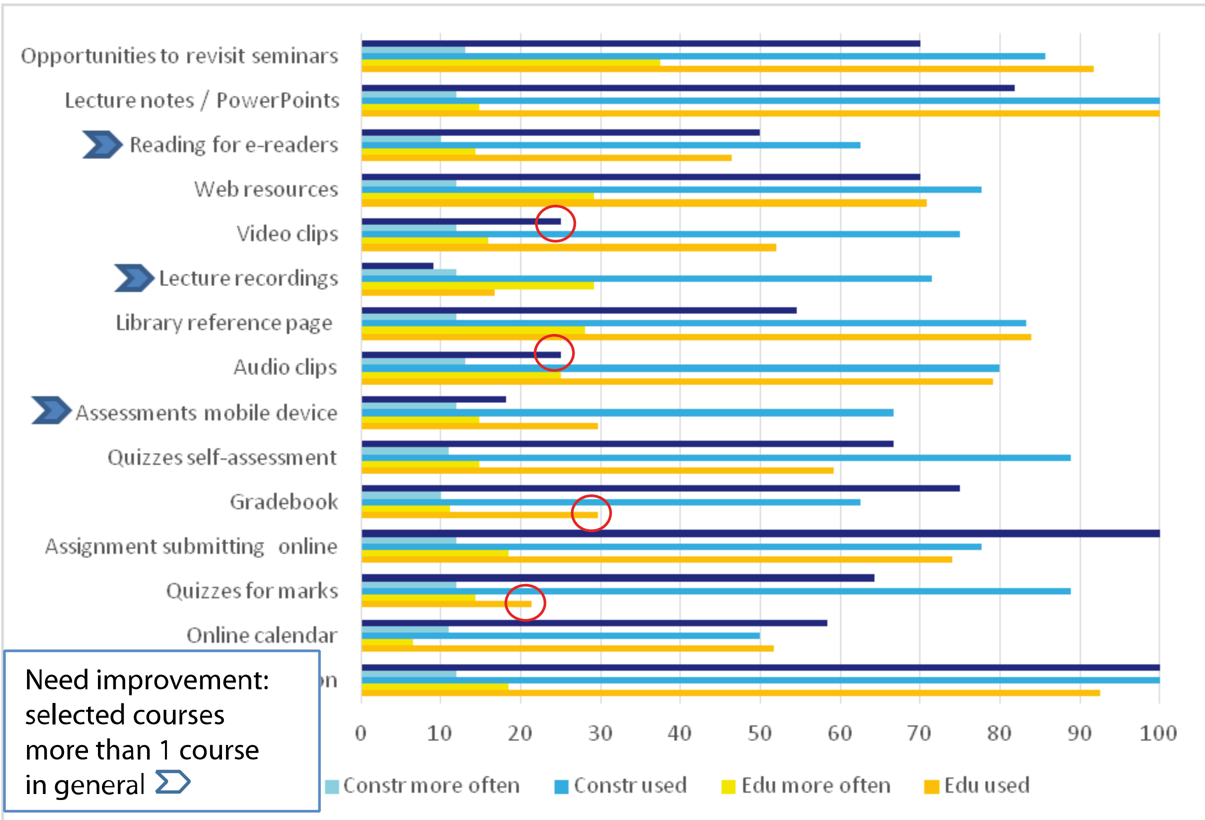

Figure 3. Teaching Presence: Design and Organisation: present use of tools

The preferred assessment method for post-graduate studies is the written assignment, and most faculties prefer online submissions, while Construction also used online quizzes as formal assessment. Quizzes and marks in the Gradebook are useful to monitor progress, and pace students in achieving outcomes. While courses all have sufficient organisational information about the modules in the study guides, only half the students have access to the

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online calendar, missing the benefits of having an integrated course and personal calendar at their fingertips.

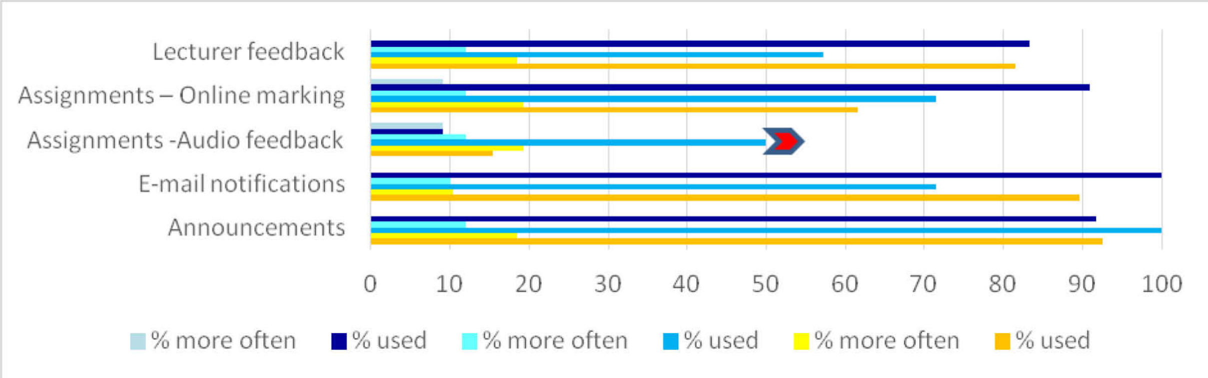

Figure 4. Teaching Presence: Direct Instruction and Facilitation

Teaching presence also requires hands-on teacher activities in the form of facilitation and direct instruction while the course is in progress. Reports on tools enabling both these teaching activities are shown in Figure 4. In two of the faculties, more than 80% students reported receiving lecturer feedback to their assignments, while one group reported receiving less feedback, also mentioned in open-ended comments in the survey. They were not really left in the cold, as their understanding would be confirmed through automated feedback in quizzes for self-assessment (Figure 3). Education lecturers (interviewed) preferred grading papers by hand, in line with low CMS use in Figure 3 and less online marking (Figure 4). Many of their students would like to have more lecturer feedback, particularly in electronic format. Lecturers in EMS made consistent use of online marking and providing electronic feedback. Only construction provided some audio feedback. E-mail notifications and Announcements were used for generic feedback that supplemented individual assignment feedback, and all courses made use thereof. Interestingly, EMS students were also more satisfied with the level of ICT use in their courses and seldom wished for more of any online tool or activity.

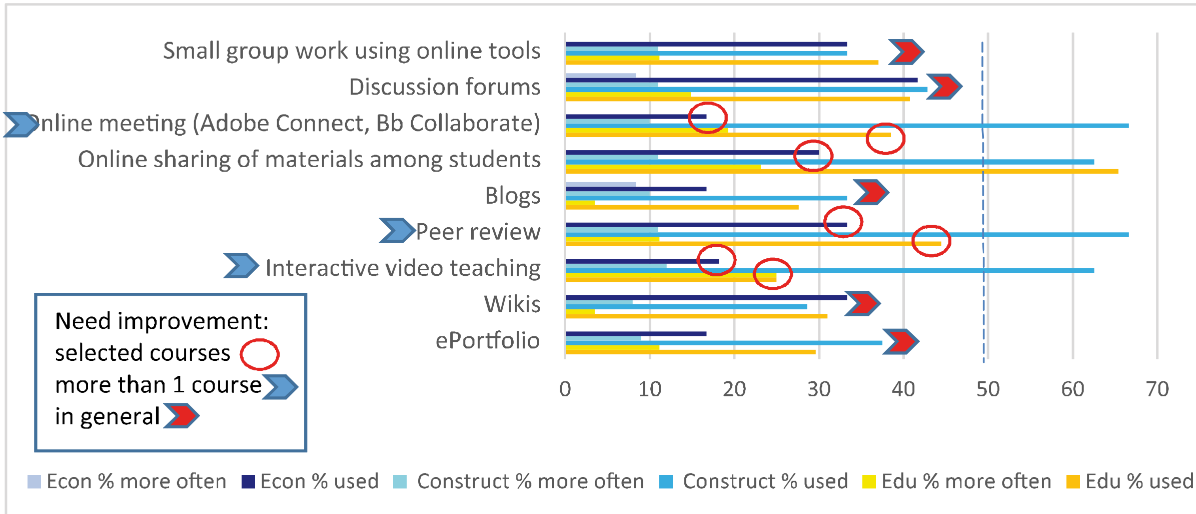

Figure 5. Social Presence & Cognitive Presence

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> *"Social presence is the ability of learners to project their personal characteristics into the community of inquiry, thereby presenting themselves as 'real people…Instructional media such as computer conferencing engender high levels of student-student and student-teacher interaction; therefore, they can support models of teaching and learning that are highly interactive and consonant with the communicative ideals of university education" (Athabasca University, n.d.)*

Lecturers should engage and foster student engagement and social presence to support cognitive presence and problem solving. Figure 5 shows a low level (< 50%) use of tools that can foster those presences. The blended courses did not use discussion forums as the backbone of collaborative learning as is common practice in online courses. This suggests that the concomitant skilful facilitation that should grow the online learning community was also absent. The poor use of social media, web conferencing and creating and sharing videos seen in Figure 1, suggests that students are not very adept in these skills, and would also need training and support in using them. One lecturer created online meetings with Blackboard Collaborate and availed recordings for later viewing. This group also interacted with peers through Peer review, and as such shared insights and documents. Education students using Facebook (Figure 1) probably also used it for privately sharing resources (Figure 5). They showed a high demand for more interactive tools. The findings confirm that in blended and flipped learning (Sams & Bergmann, 2013), social and cognitive presence activities usually took place in classroom seminars or tutorials rather than online.

> *"Cognitive presence is the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication…the practical inquiry model operationalizes cognitive presence for the purpose of developing a tool to assess critical discourse and reflection" (Garrison et al., 2001).*

CoI Cognitive presence scores for CWM were sufficient due to collaborative activities during block weeks, and relevant and challenging problems presented in class. Based on Figure 5, it seems that the greatest challenge facing the reduction in contact meetings is the online collaborative work necessary for practical inquiry. Coordinators are not yet using the online meeting and interactive video teaching platform or peer review tools widely enough to foster collaborative problem solving. They would need help in implementing small group online work and discussion forums while the role of the lecturer should be redefined to that of online facilitator who can steer online activities. Dispensing with face to face lectures, assessment based on essays and written exams should also be replaced by blogs, wikis or ePortfolios that are better aligned with constructivist learning and outcomes. Achieving critical thinking and the desired course objectives will require careful course design based on the CoI, with particular attention to the four phases of the practical inquiry model (Athabasca University, n.d.). For lecturers used to blended learning, this is foreign territory and will need training and support in addition to bespoke course design.

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Conclusions and recommendations

The profile of our CWM students differ significantly from the undergraduate students. Some of the full research Masters students are full-time or part-time students, while all CWM students are in full-time employment. Accommodating those students' needs will require well-informed course design and development, based on the current analysis (Clark, n.d.). We confirm the importance of using smartphones for studying (Tracey, 2014), the amount of time coursework students spend studying at work and the associated time-management pressure (Tracey, 2014). Blended CWM programmes are already using tools that support Teaching Presence, while a few might improve utilisation of some of those tools. The amount of contact time can be drastically reduced and the quality of learning enhanced if lectures are replaced with recorded lectures or videos in a flipped classroom approach (Kellogg, 2008; Sams & Bergmann, 2013). Urgent attention needs to be given to online streamed meetings and the introduction of facilitated online discussions across the board as they will help increase Teaching, but most importantly Social and Cognitive presence (Garrison et al., 2001). Online collaborative tools and activities were mostly lacking, as were tools for reflection, collaborative problem-solving and constructivist knowledge assessment. Students are already receiving orientation and training necessary to engage in blended learning, but to include additional tools, self-directed online orientation (Pintz & Posey, 2013) can prepare them for more online coursework. With the findings gathered during this analysis process, we are better equipped to re-imagine each of the courses delivering their objectives (Clark, n.d.), and preparing students for the workplace. Based on analysis, we know where the imagined change management, additional training, orientation sessions and supportive resources are needed to design and develop courses along the ADDIE model for online implementation.

Design recommendations for our CWM

- Suitable conceptual content can be converted to audio or multimedia representations;
- Lectures should be captured and made available for reviewing;
- Interactive video lectures could partially replace contact sessions;
- Lecturers should be trained to facilitate online interactive engagement and activities;
- Daily discussions or other interactions should be accessible on a mobile device;
- Feedback from lecturers on all submissions should be prompt and include personalised or audio feedback;
- Deadlines for full-time working students should accommodate their work/study time restrictions;
- Alternative assessment practices like journals, e-portfolios and peer review should be added;
- Optional pre-course orientation should include ICT use, the CMS, social media and reflective tools.

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PEN OR KEYBOARD – AN EMPIRICAL STUDY ON THE EFFECTS OF TECHNOLOGY ON WRITING SKILLS

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State of the art

As stated in the scope of the conference "The social and socio-economic context is more important than ever. Society itself can be understood as a learning environment, with questions of learners' connection with the community and the empowerment of the practitioners". This means that certain skills, the so called 21st century skills, must be prompted and developed. Writing skills are of paramount importance in this context and, as educators and researchers, we are primarily engaged in understanding the effect the use of mobile devices has on such abilities.

The relation between digital tools and writing skills regards different scientific fields, such as education, neuroscience and sociology. Everyone, teenagers in particular, is used to communicate through smartphones, tablets or PCs, writing short text messages. However, in these cases, writing skills are not developed in an efficient and productive way even if they are practiced every day. International studies and research highlight a drastic reduction of argumentation capabilities in writing for people who make too much use of texting.

Research carried out by Drew Cingle and Shyam Sundar (2012) from Penn State University (USA) has shown that an excessive use of short text messages compromises grammar accuracy and linguistic skills in high school students. Jennifer Myers (2012) from Calgary University states that reading on paper and using traditional tools for writing promote a more creative use of the language; this does not happen with digital writing. A study by Cambridge Assessment (Suto, 2012) carried out among 633 university teachers states that writing skills have been considered at the top of university students' problems.

Even if certain advantages are present due to almost synchronous communication, at the same time a strong limitation on the potentialities of both written and oral language use occurs. Crystal (2001) talks of an Internet language made of a mixture of oral and written speech, which has an impact on learning and on certain skills in particular.

In 2012, a conference entitled *Handwriting in the 21st century? An educational summit* has been organized in Washington (USA). During the summit, it was highlighted that the obligatory use of keyboard in primary school writing activities generates problematic issues. In the USA, youngest generations face difficulties when they have to read handwritten texts.

In relation to this, the conference indicated the need to change this situation and reintroduce handwriting as a necessary activity for the development of learning, argument and critical thinking skills.

Also neuroscience is interested in the effects of handwriting. Studies in the field highlight differences in learning among students who use digital tools to write and students who write by hand (Longcamp et al., 2008, 2011; Spitzer, 2013). Handwriting influences reading comprehension because it activates different and specific parts of the brain: handwritten character recognition happens in connection with handwriting muscle movements, providing, at the same time, visual receptors and memory capacity (Longcamp et al., 2011). In China, for instance, it has been shown that computer writing severely restricted primary school students reading skills. In one of the most recent reports by OECD, *Students, Computers and Learning. Making the Connection* (2015), for the first time, the Organization state that better results in reading are shown by those pupils who make less intensive use of technology in learning.

Within the above context, this contribution refers to the activity carried out at Roma Tre University, where a group of students' writing skills have been tested, taking into account critical thinking skills levels as a referential criteria. Assignments foresaw the use of pen or keyboard on different controlled situations. Data and results were analysed accordingly and compared as described below.

Research design and methodology

The present study carried out within the module *Writing Methods and Techniques in Education*, hold out at University Roma TRE – Laboratory of Experimental Pedagogy (LPS), starts from the assumption that students can develop their writing and critical thinking skills thanks to specific writing activities. Such activities regard the elaboration of short essays, both by hand and on computer keyboards, with the aim to highlight the gap in results. The development of critical thinking skills is at the basis of other LPS researches (Poce, 2012) where the study of classical authors in a structured learning path has shown development in the students' personal and critical elaboration of knowledge.

The general objective of the module where the experimentation took is to improve students' writing skills in different disciplinary and learning contexts. Meta-objectives have been identified in the opportunity for students to improve also their correct use of the language (grammar, morpho-syntax, lexicon accuracy), argument skills and to develop critical thinking and creativity skills as well.

Over the lecturing, students have produced short essays on the topics discussed with the lecturer. Assignments were marked by LPS researchers, using an *ad hoc* essay assessment grid. Short essays written by students were produced in two different ways: by hand or keyboard. All data have been collected and analyzed to highlight the different results in skills development according to the writing tool employed.

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In the following paragraph a description of the assessment tool based on critical thinking level indicators is given.

Assessment tool

A short essay is a semi-structured test in which students have to present their ideas following a given structure. The main purpose of this kind of test is to present a set of ideas on a given topic following the order that makes most sense to a reader; therefore, the focus of an essay is its linear and logic structure.

The initial thesis provided in the guidelines, the limited time and space frame and the attention to the typical essay structure represent close *stimuli*, which the student must use in order to organize the development of the proposed topic. In particular, the guidelines contain a thesis, a series of questions the student has to answer, the sources and data given to develop and support his/her personal thesis and a predetermined text length. The presence of these stimuli facilitates the production of more homogeneous tests and, consequently, an easier use of an essay assessment grid.

Within this project, a specific assessment grid was outlined to evaluate students' essays. In a short essay, one's verbal ability is used in a specific way, that is in relation to the correct use of language and argumentation of a specific topic, and not in a general way. In this way, the teacher is able to evaluate the students' critical acquisition of knowledge and how they use this knowledge in their essays. Moreover, the acquisition of specialized vocabulary will be clear and immediate. In relation to this, the essay assessment grid contains a macro-indicator of *Basic linguistic skills*, thanks to which the evaluator can assess linguistic form of the text.

As for other macro-indicators, *Justification* assesses students' ability to elaborate on their thesis and to support their arguments, throughout their short essay. An essay is a specific kind of text that contains all the information readers need to know in the order in which they need to receive it; the ability to produce written argumentation on a given topic is paramount to write a good essay.

Relevance is a macro-indicator that analyzes text consistency, such as the correct use of outlines and students' capability to accurately use given *stimuli*. Therefore, short essays involve several different operations: introducing the argument, analyzing data, raising counter arguments, concluding; this indicator assesses the correct text structure.

The *Importance* macro-indicator assesses the knowledge students use in their essay; asking students to write an essay on a specific topic is a good way to assess the bulk of their study.

Finally, *Critical evaluation* and *New ideas* are macro-indicators that analyze students' critical thinking skills, by assessing personal and critical elaboration of sources, data and background knowledge with the use of new ideas and solutions associated with the initial hypothesis and student's personal thesis.

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The macro-indicators presented in the assessment grid have been selected to help evaluators during the evaluation phase: indicators, descriptors and marks are provided in detail for an easier use of the grid and to allow a reliable test evaluation.

Table 1: Assessment grid

Macro-indicators	Indicators	Descriptors	Marks		Score
Basic linguistic skills	Grammar Accuracy (Punctuation, Spelling, Morpho-syntax, Lexicon)	Expression is ❑ rich and original ❑ appropriate ❑ mainly correct ❑ not precise ❑ not correct and improper	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
Justification	Elaboration ability (thesis definition and elements of reasoning)	Elaboration is ❑ rich and articulate ❑ clear and ordered ❑ too synthetic ❑ quite consistent ❑ inconsistent	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
Relevance	Consistency (the topic under issue is mentioned)	The outline is ❑ complete, deep and original ❑ complete and correct ❑ generic ❑ partial ❑ out of line	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
Importance	Knowledge of the topic (main issues related to the topic are mentioned)	Knowledge is ❑ critical and deep ❑ complete ❑ appropriate ❑ superficial ❑ not sufficient	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
Critical evaluation	Personal and critical elaboration of sources and background	Elaboration is ❑ critical and well sounded ❑ wide and adequate ❑ essential and simple ❑ partial ❑ contradictory	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
New ideas	New information, new ideas and solutions to the issues raised in the question	New information and possible solutions are inserted ❑ widely, critically and originally ❑ deeply ❑ correctly ❑ simply and/or partially ❑ no new information and solutions are given	Excellent Very good Good Insufficient Clearly insufficient	5 4 3 2 1	1-5
Final mark			Total		30

The above essay assessment grid was used by LPS researchers to evaluate short essays written by the students engaged in the *Writing Methods and Techniques in Education* module active in the Education course at Roma TRE University.

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Analyses and findings

The evaluation of the students' short essays has shown an improvement as for all the skills connected with Critical Thinking macro-indicators and students' writing ability itself. The table below highlights results by each student (A, B, C, etc.) participating in the module on each test and their results are measured on a scale from 5 (*Clearly Insufficient* for all the indicators) to 30 (*Excellent* in every indicator). In general, students have improved their ability to write texts in various disciplinary and learning contexts.

Table 2: Activities and results

Student	First test	Second test	Third test (keyboard)	Fourth test	Fifth test (Keyboard)	Sixth test
A	16	20	21	25	21	26
B	24	/	/	25	/	18
C	17	22	19	30	27	30
D	20	24	15	20	17	21
E	19	15	20	24	19	24
F	20	23	28	28	27	23
G	16	/	16	/	/	/
H	15	16	20	22	22	26
I	15	22	20	29	22	22
J	15	/	15	19	22	23
K	19	15	26	26	/	22
L	27	/	27	26	23	29
M	19	23	/	26	22	23
N	21	26	27	29	26	27
O	20	/	/	23	23	25
P	18	17	18	26	20	21
Q	19	/	/	24	/	/
R	16	21	24	28	22	28

As shown by the comparison between the first and the last test, most students have improved their writing skills: test score has increased from 1 point (e. g. student D) to 13 points (e. g. student C).

Only in the case of student B results test worsened in the last test compared to the first: however, as shown in the table above, student B did not complete all the learning path activities and wrote only 3 short essays out of a total of 6. For this reason, student B's performance cannot be taken into account for the overall evaluation of the project.

In general, the trend of the last test score is good and 4 students out of a total of 16 (25%) obtained an excellent mark (27-30 points).

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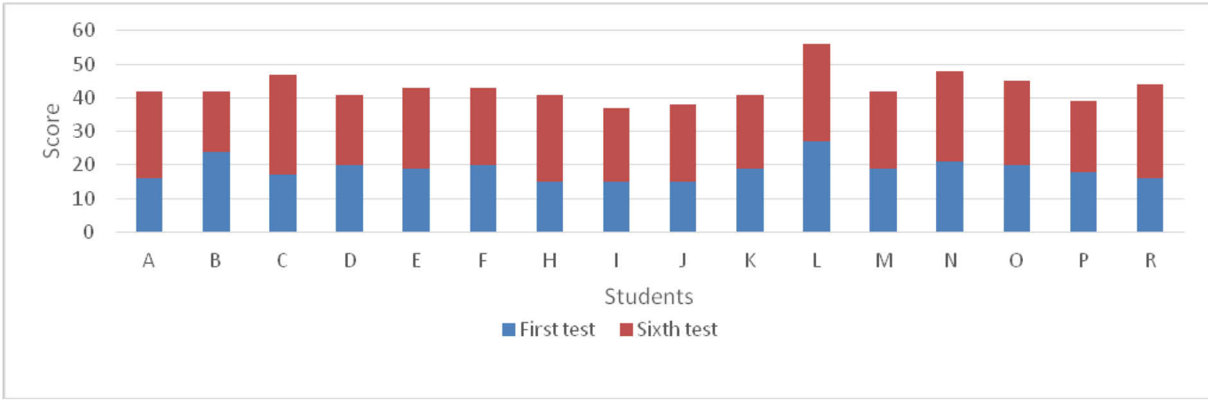

Figure 1. Comparison of First test and Last test

In particular, handwritten short essays got higher scores than computer written texts: collected data shows that short essay written on keyboard usually worsen the student's performance over the learning path.

If we take the case of Student C, as shown in the following tables, she/he has significantly improved her/his performance during the project, going from an unsatisfactory first test (17 points) to an excellent final test (30 points); it must be noted that all short essays written on keyboard obtained a lower score than previous and following tests, probably affecting his/her learning path trend.

Even if the third test score of Student A is higher than the second one (second test: 20 points; third test: 21 points), it reduces the learning path performance improvement. Student A's test scores increase on average by 4 points, except in tests written on PC: third test (1 point) and fifth test (-3 points).

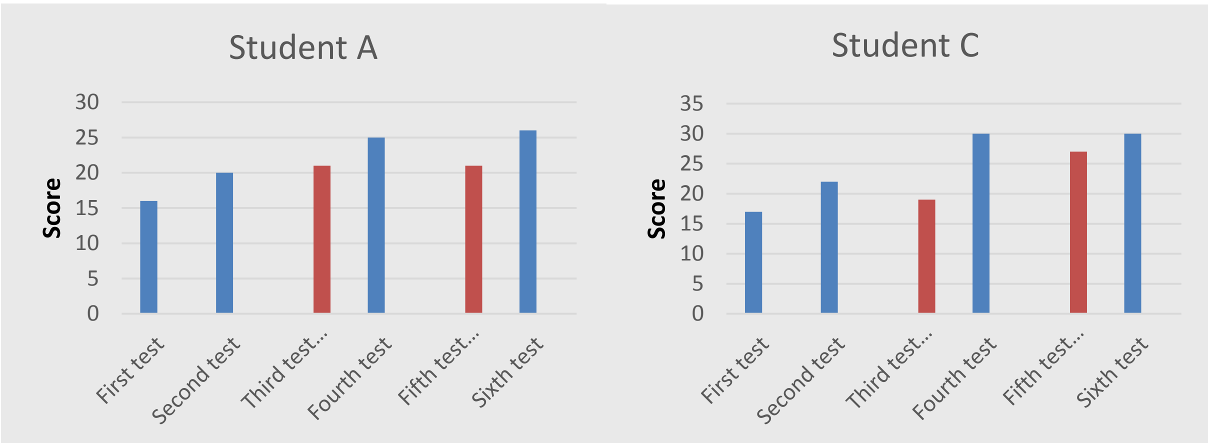

Figure 2. Students A and C results in all the activities

A more detailed comparison between the score of the third keyboard test and the fourth handwritten test shows different performances for each student: in most cases, the fourth test has been marked with higher scores than the third one. In some students' performance, the difference in marks is very high between the third and the fourth test (e.g. Student I: 20 points in third test vs. 29 points in fourth test; Student P: 18 points in third test vs. 26 points in fourth test).

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All fourth test scores are passing (good) scores and 5 students out a total of 13 (38%) obtained an excellent score. On the other hand, 11 third test performances are lower than fourth test ones.

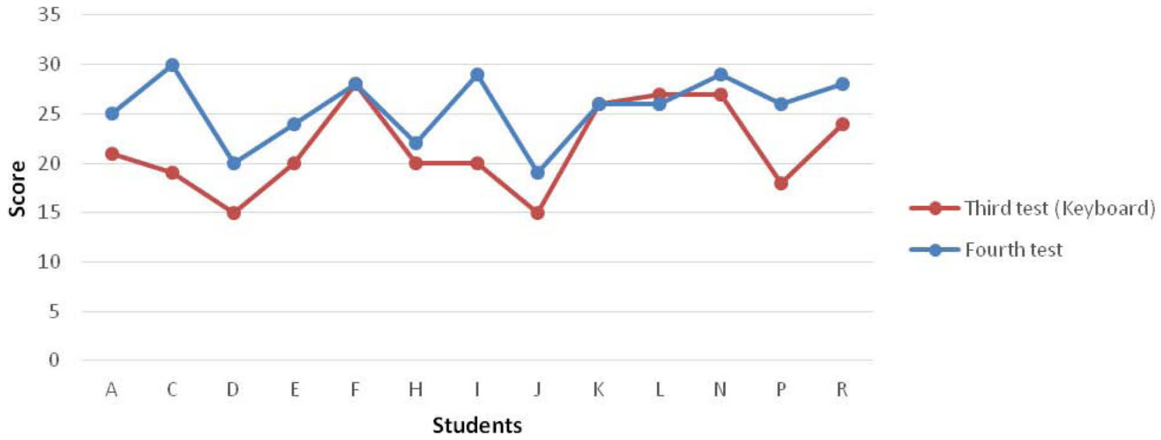

Figure 3. Comparison of third test (keyboard) and fourth test

Conclusive remarks and possible developments

The figure below represents a synthesis of the trend of the essay tests performed. Results for keyboard tests are clearly identifiable.

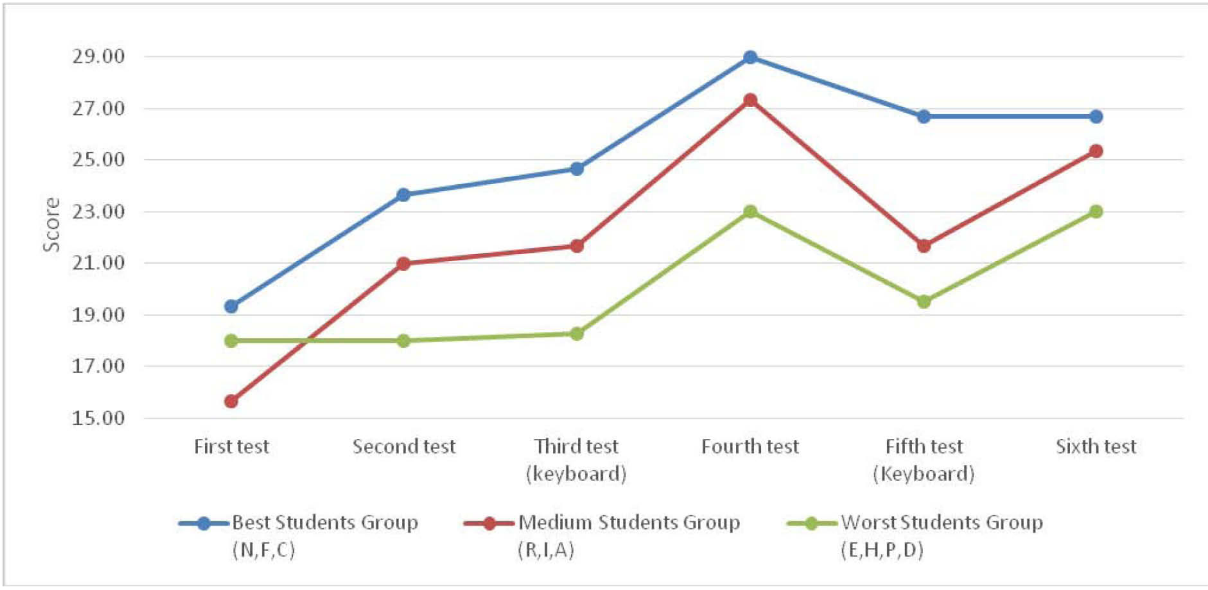

Figure 4. Comparison of all the activities for group of students

From the analyses carried out and the results shown in the figure above, some main considerations can be singled out:

- the project learning path aims at successfully developing correct use of the language (grammar, morpho-syntax, lexicon accuracy), writing and argument skills as well as critical thinking and creativity;
- the use of PC in writing activities reduces the performances of the majority of students.

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Therefore, the experience within the project demands researchers to further develop such a model further, also extending its application to other fields of knowledge. It would be, in fact, interesting to observe if this model, which asks students to reflect through writing short essays, analysed in the above mentioned modalities, promotes critical thinking and written production, even in a context where, traditionally, it is not common to read and write about topics based on essentially humanistic and pedagogical features.

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Authors

Antonella Poce coordinated the research presented in this paper. Research group is composed by the authors of the contribution that was edited in the following order Benedetto Vertecchi (State of the Art), Antonella Poce (Research Design, Methodology and Conclusive remarks), Francesco Agrusti (Assessment tool), Maria Rosaria Re (Analyses and findings).

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GUIDING STUDENTS TO BECOME LIFELONG LEARNERS: FLIPPED CLASSROOM AND MEANINGFUL PARTICIPATION IN A BLENDED-LEARNING ENVIRONMENT

Teemu Leinonen, Eva Durall, Aalto University, Finland

Abstract

In this article we present a good practice of combining several teaching strategies such as blended learning, the flipped classroom and self-directed study activities in a MA level course, with the aim of helping students develop lifelong learning skills. We report how we adopted the flipped classroom model in several editions of the *Introduction to Media Art and Theory* course through the organization of fishbowl discussions with the students about the homework assignments they were asked to prepare before the classes. The course final assignments consisted in a video essay that the students had to produce in small groups and present to the class. The video essay required students to do research, define a research question and develop a critical attitude towards the topics explored. We analyzed the students' feedback as well as the video essays submitted by the students in order to assess if the course provided them a meaningful learning experience and if it helped them become lifelong learners. We conclude that the course achieved the intended goals and that it represents a valuable case to discuss among the educational community.

Introduction

The research and development of online and e-learning can be categorized to be lead by two different paradigms. The first one emphasises access and productivity of education. Online learning environments and use on online content, tools is seen to provide possibilities for more students to take part in education. MOOCS are a good example of this. Within a MOOC anyone with an internet connection may take courses of the world's top universities. The other, with less media coverage, vision, has been research looking possibilities to improve the quality of learning. In this tradition the qualitative improvement is seen to be more important that making current educational practice more cost efficient. The roots of the vision are in the early days of computer supported collaboration research, such as Douglas Engelbart idea of augmenting human intelligence with networked computers (Engelbart, 1962).

In our online and e-learning research we have followed the later paradigm. In this paper we present one MA-level university course that builds on it. The core idea in the design of the course has been to be *digital first* with meaningful online activities. When aiming to this we have borrowed from and applied approaches from the flipped-classroom and personal learning. The design of the course has been an iterative process of experimenting with various practices and activities in the last four academic years during five implementations of the course. We have gathered feedback from the students during and after the course and used this to inform discussions on the course redesign at the planning stage of each new implementation of the course. This way the development of the course has been influenced by participatory action research (Reason & Bradbury, 2008), although the individuals representing the community have changed during the years.

In this paper we start with a compact literature review presenting the idea of flipped-classroom, personal learning environment and self-organizing learning environment. After this we describe the case, the design and the latest implementation of the *Introduction to Media Art and Culture* course. We end the paper with concluding remarks and discussion about the possible value of the research for practitioners and frame possible topics for further research.

Flipped-Classroom and Personal Learning

Research on learning has shown that to develop deep understanding students need to be active participants in the learning situations (Beichner & Saul, 2003; Hake, 1998). Although lecturing can be useful under certain conditions (Schwartz & Bransford, 1998), its use as the main and only teaching method has been strongly criticized (National Research Council, 1999; Knight & Wood, 2005).

The recognition that students construct their own learning and that social interaction contributes to the creation of meaningful intellectual engagement (Vygostky, 1978) has guided the design of alternative methods that foster discussion and collaboration. Furthermore with the group work activity we have aimed to empower students to be teachers in the course by asking them to prepare video essays that are explaining some core content of the course. The video essays have then been screened and discussed within the whole class.

The flipped classroom is a teaching strategy that inverts traditional way of structuring classroom activity with the aim of supporting higher levels of engagement and deep understanding (Strayer, 2012; Lage et al., 2000).While in traditional settings time in the classroom is often used for delivering content from teacher to students and the application of the new information provided usually takes place informally out of the classroom and between the classes, in the flipped classroom the order of these activities is inverted. From this perspective, students are also asked to take responsibility of their own learning, to be active subjects in it. In practice, in a flipped classroom, students are asked to familiarize themselves with the course content in advance the course meetings. Time spent in class is then dedicated to practical applications of the course contents through activities centred on questions, inquiry, problem solving, group discussions and students' presentations.

Although the flipped or inverted classroom has been used by educators for ages, the adoption of information technologies, especially online systems, has created a new scenario in which face-to-face meetings are combined with online learning experiences (Strayer, 2012). This way

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there is a connection to the idea of blended learning, emphasising the convergence of face-to-face and distributed learning environments (Graham, 2006). According to Graham et al. (2003) some of most common reasons why educators choose blended learning are the possibility to improve pedagogy, increase access and flexibility and gain cost effectiveness. In the flipped classroom approach, the adoption of blended solutions is oriented towards improving the pedagogical design of the course and therefore, the students' learning experiences.

In 2007, the online and e-learning research community started to discuss about the possibility to have *personal learning environments* (PLE) as an alternative to the *learning management systems* (LMS) that were the dominant underlying technology in the field. The shift from LMS to PLE is related to the rise of new technology, tools and services that made social interaction easier online. Open internet standards, lightweight application programming interfaces (APIs), blogs, micro-blogs, wikis and social networking services were demonstrating how people can work together in the open internet (Poldoja, in press).

Wilson et al. (2007) defined PLE by its difference to the LMS. Whereas LMS is a single system that is expected to provide all the services needed to run and take part in a course, PLE was said to be an open system where central is the coordination of connection between the learners. From the pedagogical point of view, the PLE idea emphasises learner as the central actor in the course, when in LMS the coordination is mainly teachers' task. Therefore, the PLE is asking students to find meaningful content on the topic they are studying and to share it with their peers instead of the teacher providing the content in a LMS.

Johnson and Liber (2008) have seen PLE's to be potentially disruptive to the current system of providing education. They argue that PLE's could radically change the relationship between the providers of education (institutions) and learners (students). In the PLE the model is learner-driven and -centric instead of being provider-centric. When taken to its extreme, the PLE can be a system where learners select their tools for learning, set their own learning goals, decide on the resources used in the studies as well as set evaluation criteria and do evaluation of their learning results themselves (Väljataga & Laanpere, 2010). Bringing PLE-thinking to the university pedagogy is a strategy to keep university education relevant. For universities, which are aiming to educate students with independent research skills, this is also very natural.

PLE can be defined to be planned and organized practices to follow, study and share interesting pieces of information. As a such it can be seen as a way to apply lifelong learning. For children and schools Sugata Mitra (2015) has developed the idea of Self Organised Learning Environment (SOLE) where there are similarities to PLEs. In a SOLE classroom students are asked to study independently big questions that are expected to spark their curiosity. In small groups students are using computers with Internet to search and find information. In the end of the SOLE-session students are presenting their findings for each other. This makes SOLE a student-driven learning environment with the following principles:

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curiosity, collaboration, and facilitation through adult encouragement, self-organization, socialization and engagement (Mitra, 2015).

The principles that guide the design of the practicalities and the learning environment where the learning takes place are critical when aiming to have high quality education. In many cases, these principles remain as unquestioned traditions. The tacit knowledge on how teaching and learning should be is easily transferred from one generation to another. The transfer of existing societal conventions and structures in education is sometimes called hidden curriculum. The hidden-curriculum is often seen as an unplanned (or planned) and negative side effect of education. As a teacher in a course we plant – some time intentionally, some time unintentionally – our norms and values to our students. When norm and values are not recognized, neither discussed openly with the student they stay hidden, although having a great impact on the students (Broady et al., 1986).

Behind the flipped classroom, PLE and SOLE we may see a positive hidden-curriculum. By helping students to carry more responsibility about their own study work they may develop curiosity and skills needed in a self-directed lifelong learning. This approach is asking new role and new patterns of behaviour from teachers, too. For instance, the main character in *The Ignorant Schoolmaster* (Rancière, 1991), Jacotot puts it in words as follows: "To explain something to someone is first of all to show him he cannot understand it by himself" (p.32).

Case Study: Introduction to Media Art and Culture

In this study we have taken a closer look at the *Introduction to Media Art and Culture* course. In the following section we explain the course design, the data collected from two latest implementations of the course, as well as results gained by looking precisely how well the course has served to help students to become lifelong learners. Furthermore, from the data we have looked how students felt about the flipped-classroom activities and if the assignments make the study work meaningful for them.

Course design

Introduction to Media Art and Culture is a 3 credit points MA-level course. The course is organized as an intensive lasting three weeks, four days with three hours per day in a classroom. In addition to the 36 hours of classroom activities students are asked to dedicate 45 hours to prepare to the classes and to do the assignments. The number of students is limited to 40 and the course is led by two teachers and one teaching assistant. The general structure is that the first week focuses on media culture and media studies and is lead by the first teacher. The second week is lead by the second teacher who leads students to contemporary discussion about media art. The third week is lead by the students and dedicated to their presentations and discussions about them.

The objective of the course is to introduce central ideas that form both contemporary media art practice and media culture discourse. Within the course students will have pointers for further studies on the topics. The course will cover parts of the book *New Media: A Critical*

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Introduction by Martin Lister (ed.) with a number of examples from both media art and media culture studies. For each topic of the course there is a categorized article and video library accessible in the website of the course.

In the course there are two types of assignments which students do between the classes: (a) the homework readings, screening (videos, documentary movies etc.) and a museum/gallery exhibition visit, all are followed by a fishbowl discussion in the class and (b) a study in small groups with results presented in a form of a video essay.

Every classroom session starts with a fishbowl discussion about the homework. In the fishbowl there are four chairs that are located to the middle of the room making a small circle, the fishbowl. The fishbowl is surrounded by large ring of chairs. Three students are asked to come to the fishbowl to discuss about the homework. One chair is left unoccupied. When the discussion starts anyone from the outer ring may come and sit to the free chair. When this happens one of the original three debaters must leave to the outer ring (Figure 1).

Figure 19. Fishbowl discussion in the classroom

The second assignment is done in a group of two to three students. The members of the groups are selected randomly. Each group selects blindly two media art and media culture related concepts, such as *generative art* and *internet*, or *cultural jamming* and *augmented reality*. The study groups' task is to find out about the terms and combine out of them a coherent video essay. The video essay must last about 2-5 minutes with 2-3 minutes of spoken voice over. Students must also deliver the text of the voice over with the list of references. When ready the videos are uploaded to some online video service, such as Vimeo or YouTube.

Data Collection and Analysis

We have collected two types of data from the participating students: (a) open, written feedback where people are free to write anonymously what they think about the course, and (b) the video essays done by the students. Furthermore, as the teachers of the course we have observed and participated in all the course activities, such as fishbowl discussions and the museum/gallery exhibition visit.

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The analysis varied depending on the type of data. For the data consisting in the feedback provided by the students (N = 53) we carried out a thematic analysis. We adopted an inductive approach. From the students feedback we generated the codes that were then used to categorizing them. The categories were contrasted with our initial impressions to contextualize and interpret the data. For the video essays, we analyzed the materials submitted by the students according to the assessment criteria provided at the beginning of the course. The extent to which these criteria were met, enabled us infer the competences developed by the students.

Results

With the analysis of the data we aimed to answer three research questions: (a) How did the students feel about the flipped classroom activity? (b) How meaningful and relevant students found the course? (c) Are there any evidences that indicate that the course helped the students become lifelong learners?

The students' feelings related to the homework assignments, which were key in the flipped classroom approach, showed a mixture of perceptions. Although the students made positive comments about the course assignments (62.2%) and appreciated the high levels of participation during the class sessions (62.2%), they also expressed negative views towards the assignments (71.6%). Mostly, students complained that there was little time to do the homework and prepare for the classroom discussions. Our understanding is that it is important explain for the students that the flipped classroom model may increases students' workload from what they are used to. This may help them to manage their time. It is also important to provide the study program in detail with the homework tasks in the beginning of the course, so that students will have more freedom to plan their own time and are not forced to do the homework only between the class sessions.

Over 1 out of 5 students (22.6%) indicated that the overall experience was very positive and that it was a relevant course for their studies. In general, some of the aspects most highly valued by the students were the course contents (30.1%), the quality of the lectures and the diversity of lecturers (45.2%), as well as the assignments (62.2%), which were considered interesting and relevant, especially the readings and the following classroom discussions (62.2%). In relation to the course contents, students were also critical (49%). In the feedback they pointed out topics that they would like to further discuss as well as some redundancies in the content. These comments have been extremely valuable for redefining some of the course topics. The fact that students are able to identify gaps and make proposals, also suggests that they have developed a broad enough and critical view of the course contents.

The course final assignment, the video essay, was conceived as a small self-directed learning activity. The assessment criteria provided at the beginning of the course offered some guidelines that connected with self-directed learning skills such as the ability to formulate elaborated questions, identify what one knows and what one ignores, find relevant sources of information, make connections, be critical and build personal opinions. The analysis of the

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final assignments (N = 20 videos) shows that the students were able to define good research questions (65%), use relevant references (70%), make connections (95%) and build personal (80%) and critical (80%) visions of the researched topics. Based on this analysis, we conclude that the course helped the students in developing important skills for becoming lifelong learners.

Conclusions

The analysis of the IMAC course based on the research data shows that the teaching strategies applied during the course – flipped classroom, high levels of participation and self-directed study activities – helped to achieve the intended goals: give the students a broad overview of the field and help them build critical and informed positions. We claim that the analysis of the final assignments shows that students have acquired relevant skills for engaging in self-directed learning. In this regard, we consider that the research brings an interesting case based on the use of the flipped classroom model.

We must acknowledge certain limitations in the study, mostly due to continuous updates and redesigns of the course, which make difficult to make comparisons between the courses' different editions. In addition, further research needs to be conducted in order to proof to what extent the flipped classroom model effectively supports students in developing a PLE-mindset that will help them become lifelong learners. We consider that including the hidden curriculum (positive and negative) debate among the educational community designing and implementing e-learning and blended-learning course is important, since this will have a strong impact on the role of formal education institutions in the future. To stay relevant in the global competition with growing offering of online course, educational institutions must have a vision and ability to implement course that will add value to the learning experience by providing skills to be an independent lifelong learner, such as curiosity, research and group work skills.

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IMMERSIVE LEARNING – LEARNING PATTERNS INSIDE DIGITAL CULTURAL IMMERSIVE EXPERIENCES IN SITU

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Abstract

The paper presents a categorization of visitors learning patterns inside the immersive environment PLACE-Hampi, designed by Sarah Kenderdine and Jeffrey Shaw. The paper is focused on how visitors learnt about a new technology, the immersive platform PLACE. It is based on the qualitative data analysis in NVivo of 92 interviews and observation of 500 visitors inside three different exhibitions in Germany and Australia. The methodology used is a combination of four different qualitative methods: grounded theory, digital ethnography, narrative inquiry and case study.

Introduction

How visitors can learn about a new platform inside a museum?

The paper presents the patterns about visitors' learning a new technology inside the museum space. Those patterns emerged from qualitative data analysis done on interviews and observations inside the immersive environments PLACE-Hampi. The paper is structured in this way: the 2nd paragraph, I summarized some of the key approaches to learning evaluation in museums, the 3rd paragraph is about the case study PLACE-Hampi, the following paragraph summarize the methodology, the last paragraphs presents the results, in the conclusions, a possible development of this research is described.

Approaches to learning in museums

"Museums are public and social places of learning" (Crowley, Pierroux, & Knutson, 2014). One of the key missions of a museum is to offer visitors a learning experience and learning is one of the main reasons why people go to museums (Hooper-Greenhill, 1999). Learning can be formal (structured activities with evaluation and testing of new skills, knowledge, etc.) or informal (all other forms of learning, occasioned by everyday life, which are neither structured nor planned). Learning in a museum can be seen as a combination of formal and informal learning: museums can be used by teachers for formal learning on a specific topic with guided tours and a test at school later or the museum can be used as a playground for informal learning by individual visitors, groups, couples and families. Museums often offer activities addressed to *specific users*, for example children, the disabled, families. Learning in museums is often seen as being closely linked to the concept of fun, a combination of informal learning and different levels of entertainment.

The word *edutainment* (Falk & Dierking, 2000) has been coined to express this mix of learning and having fun. Being "in the flow" is a highly positive state of mind, experienced by people when they are highly focused, highly concentrated, doing activities such as playing a game, meditating, etc. (Oxford Online Dictionaries, n.d.) it is a possible mental status also during museum exploration and spontaneous informal immersive learning activities and is linked to wellbeing and pleasure. Flow is also one of the components of *immersion*.

I will not present all the general theories about learning here but will focus on some approaches used by museums to evaluate learning and on the definition of immersion emerging from my PhD thesis (Csíkszentmihályi, 1990). To understand what people learn during museum visits, the educational departments of museums and academics in the field of museum studies and education have identified *outcomes* that can be tested before and after a museum visit.

One of the key academics in this area is Hooper-Greenhill who has written many publications, reports and papers about learning in museums. Based on the *Learning Impact Research Project, phase 1* (2001-2002), she and her team identified a list of *learning outcomes*, divided into five main groups (GLO): (a) knowledge and understanding, (b) attitudes and values, (c) skills, (d) activities, behaviours and progression, (e) enjoyment, inspiration and creativity (Hooper-Greenhill, 2002; Moussouri, 2002). GLO was tested in fifteen institutions during phase two of the project, before and after a visit. Researchers, museum staff and also school teachers, using a qualitative, quantitative or mixed method, observations, structured and unstructured interviews, focus groups, individual surveys, etc. can use these categories of *outcomes* to describe what people learn during a visit to a museum. Some of these outcomes, such as engagement, can also be tested over a long period of time in longitudinal studies (follow-up interviews).

Friedman et al. (2008) propose a framework to evaluate different forms of informal learning which also includes a list of possible learning outcomes for museums. In my opinion, Friedman et al.'s list (2008) being a simplified version of GLO, is a tool that can be used more by museum practitioners than in academic research. Hooper-Greenhill's GLO has also been included in one of the final reports about *measuring the impact of the museum* (Bollo, 2013) in the LEM project (The Learning Museum Network Project) as one of the main approaches to evaluating the *personal impact* on visitors.

Falk and Dierking (2000) point out that people remember and organize knowledge through stories and underscore the importance of understanding learning in context, in the museum. Narratives are in general data collected by researchers who use the *narrative inquiry* method (Czarniawska, 2004) (for more details see the section on methodology). Collecting and expressing *visitors' voices* is one of the roles of educators at the *museum frontier*, the museum collaborating with other institutions in the city (Golding, 2009) with inclusive and participatory practices. The approach of the School of Museum Studies at the University of Leicester to research on learning in museums is based on Hooper-Greenhill's GLO and has been used in several studies conducted in museums and galleries (Hooper-Greenhill et al.,

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2001; Hooper-Greenhill & Moussouri, 2001) in combination with grounded theory methods or GTM (Strauss & Corbin, 1998; Charmaz, 2006).

The limit of these studies is that it is not clear how they combined GLO with the patterns emerging from the data (I will describe GTM in the section on methodology) or how they defined the final categories from initial, intermediate and final *coding* (Birks & Mills, 2011).

The research presented in this paper is an attempt to show how GTM has been used in a coherent way to develop categories from data about visitors' learning patterns. The research is based on data collected in three different exhibitions where the immersive environment PLACE-Hampi has been included.

PLACE-Hampi

PLACE-Hampi allows visitors to explore 360 degree digital panoramas in an interactive way. "The panorama of the nineteenth century could be described as a long circular set that surrounded the spectator and often included props inserted between the viewer and the plane of the image, complete with dynamic (and natural) lighting effects" (Kenderdine, 2007). The panorama made its debut in the late 1700s as the *first true mass medium* (Oettermann, 1997). This was invented during the Industrial Revolution in the UK. This technology lost popularity during the early twentieth century; however, the model can be found also after this period, used for military purposes, in electronic arts (e.g. experiments in the entertainment industry such as Disney's Circorama, 1958), and for research. Since the middle 1980s artists such as Jeffrey Shaw have been working with panoramas and with augmented devices for panoramic images to extend narratives. Shaw's works, PLACE A User's Manual and PLACE-Ruhr, "reframed the traditional panorama within the new one of the virtual reality" (Kenderdine, 2007). As Oliver Grau (2003) wrote, "the platform (PLACE) is in the tradition of panoramas but innovates the way they can be explored, with a new interaction design paradigm".

Sarah Kenderdine (Kenderline & Schettino, 2011) describes PLACE-Hampi in this way: PLACE-Hampi is

> *"a vibrant theatre for embodied participation in the drama of Hindu mythology focused at the most significant archaeological, historical and sacred locations of the World Heritage site Vijayanagara (Hampi), South India. The installation's aesthetic and representational features constitute a new approach to the rendering of cultural experience, and give the participants a dramatic appreciation of the many layered significations of this site. In PLACE-Hampi, using a motorized platform, the user can rotate the projected image within an immersive 9-meter diameter 360-degree screen, and explore high-resolution augmented stereoscopic panoramas showing many of Hampi's most significant locations. The scenography within PLACE-Hampi shows a virtually representative boulder strewn landscape that is populated by a constellation of 18 cylinders, each one of which being a high-resolution 360-degree stereoscopic photographic panorama".*

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Methodology

The method used in this research is a combination of four different methods (grounded theory, digital ethnography, case study, narrative inquiry) and can be summarized as an embodied constructivist GTM digital ethnography in situ:

- *Embodied*: the researcher is in the immersive environment with the visitor, without taking notes or recording a video; the notes are written up immediately after each visitor observation session;
- *Constructivist GTM ethnography*: the researcher uses visitor observation and triangulates the observation with the same visitors; the research process follows the constructivist Grounded Theory Method or GTM (Charmaz, 2006) the researcher is aware of the potential bias in the interpretation of the experience; the researcher takes into account cultural diversity in his/her data collection and analysis;
- *Digital*: the researcher analyzes immersive digital projects in situ; this can be considered a subfield of digital ethnography (Boellstorff, 2012) the immersive environment is not online but in situ, part of an exhibition in a museum. This research is an attempt to define a methodology for the qualitative analysis of an immersive experience in situ.

In this case study, the data (notes from observations, tracking of visitor paths, interviews, comment cards) were collected when PLACE-Hampi was at the Ancient Hampi exhibition in Melbourne, Australia, in 2009 and 2010.

Results

Adopting a grounded theory approach, during the intermediate phase of the coding process I compared categories emerging from data with categories from previous theories. When I realized that learning patterns were also emerging from my narratives, I compared my codes with the theories that I mentioned in the first paragraph. I will summarize some of the preliminary results in the following paragraph.

Visitors, before learning about the content of PLACE-Hampi, had to learn how to move in the room (learn about the space), how to interact with other people learning a role (Schettino, 2003) and how to use the PLACE platform (learning about the technology). From my observations and interviews, the following types of learners of technology emerged (this is an example of categorizing by *type of users* (Strauss & Corbin, 1998):

- the self-learner by doing (the visitor learnt by trying and making mistakes);
- the self-learner by imitating (the visitor learnt from another visitor, by observing and repeating);
- the peer helped (the visitor was helped or asked for help from another visitor);

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- the customer service guided (the visitor was helped or asked for help from a member of the staff).

I will present four examples of quotations from interviews to show how I defined these categories and coded them from the visitors' indirect narrative about their learning. I never asked them directly "what did you learn?" but extracted a description of how they learnt from their narratives and then defined the four types of learners, based on their learning strategy.

Self-explorer by doing:

> *P: Was it easy for you to understand how to use the platform?*
>
> *I: Not as easy as I would have liked, I did the wrong things at the start, the information given doesn't really explain much. I took things as they came ... it was hard before I realized that you have to go into the circle thing... the directions could be a little bit better. It was quite slow to learn, you feel that you shouldn't take too much time because the other people want to see, but when I realized how to do it it was reallllly good... I had the feeling that I was really standing there...*
>
> *P: So you understood the mechanism, that you have to zoom in in order...*
>
> *I: Yes, to get in... and it was kind of exciting ... at the end it was fine, I got it. It was not explained that you have to zoom in in order to enter all these worlds...so it was a little bit confusing... then I thought that maybe I wasn't supposed to only go round...maybe I have to go in... and when I did, it was good..*
>
> *P: You had your "ah ah" moment!*
>
> *I: (laughing) yeh, I had it...*

My interpretation:

This Australian woman, originally from Australia and with long term home Australia, is describing her process of self-learning how to drive the platform. She says that at a certain point she had the intuition that she had to choose a panorama and not just move around in the virtual landscape. She expresses her excitement from that point on and she also mentions the sense of immersion and presence (she felt as if she was in the scene). She came to the museum alone and entered the room when it was empty, with no members of staff present, and learnt by exploring.

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Self-learner by imitation

Imitator

> *I: Oh yes, I drove the platform. I observed the young boy before me. Who is the dancer?*

My interpretation:

An older woman originally from Scotland (she mentioned Scotland as her home, not the UK) with long-term home Australia (she is close to obtaining Australian citizenship) says that she learnt by observing a younger visitor before her. She was able to use the platform easily but she asked me about the Shiva animation, "Who is the dancer?". She was not able to see any difference between the videos and the animations and thought that the animation of Shiva was a movie with a real person. When I explained that the image was a computer animation, based on the movement of a real dancer (a woman, not a man), she decided to go back into the exhibition to see for herself. In the next quotation there is an example of what *learning by being helped by other visitors* means.

Peer helped

> *P: What do you remember about this experience?*

> *I: We looked at the pictures before going into the dark room… And we made the platform work, my son was with me on the platform, turning round. I used the arrows to go in and out. It was quite easy. The first time that we went very close to an image and discovered that we can be a part of the image, it was exciting, finding out how it worked, and it was very nice to have this 360 immersive experience, be close to the place and see the details and it was nice to find the computer animations, the Gods, and we collected them. Ok, we found the elephants, then we found Ganesha and the rest of them, the one we didn't find was Garuda...we did not know where Garuda was and we did not find him. We worked with the illuminated board in front of us, it showed where we were in terms of the site, with a circle as the symbol of where you can go in and work with the 360 degree experience...and I also found a button that gives the Sanskrit text with the names of where we probably were, but I think that at this stage it would be nice to have an English text that gives us an idea of where we are in the site...*

> *P: The Sanskrit text is part of the mythology so it is not about the different temples; but I agree with you that it is not explained in English, so you can only appreciate it aesthetically but you don't know...*

> *I: So we made the assumption that it was where we were because I did not understand the meaning of the Sanskrit text...*

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My interpretation:

This is an example of collaborative learning and navigation. The Australian mother describes how she and her son learnt how to drive the platform. They entered a panorama by mistake and thus understood the interaction model. The mother also describes a possible way of navigating the content, looking for animations. She also talks about the excitement she felt after learning how to drive by exploring. In my observation notes I wrote about the communication between the mother and the son, who moved very slowly in the virtual landscape. From his way of driving and interacting with his mother I thought he must have some sort of disability. The mother confirmed this in her narrative. The son learnt to drive by exploring but also with the guidance of other visitors, in this case a member of his family. Two people with different abilities used the platform together, dividing the main action into two (one used the zoom and selected the panoramas, the other drove the platform, rotating inside the panorama). The woman also mentions detailed elements of the interface and how she interpreted them (the map, the Sanskrit button).

Customer service guided

> *P: Did you learn by yourself or did someone help you?*
>
> *I: An instructor told me to press this button, back and forward... and turn...t is easy to learn, also for my daughter...*
>
> *P: She operated the platform...*
>
> *I: Yes and she is only 5 years old...and it is good...*

My interpretation

A visitor with original and long-term home Hong Kong, in Australia for a holiday, says both that the family was guided by the customer service staff and that it was easy both for parents and for young children to learn how to use the platform (he described the essential elements of the navigation).

The quote from the interview demonstrates the concept of learning thanks to the help received from the customer service staff.

Conclusions

This categorization describes how visitors learn about a new technology and a new space. My categorization by learning strategy offers a way of analyzing this specific aspect of learning in immersive environments: it can be used to compare the learning process at PLACE-Hampi with the *immersive learning* of other platforms. The results are encouraging for museums, and for the designers too, because they show that visitors can learn about a completely new technology, adopting different strategies. Comparing what the designers said in their interview and what they wrote about explorative learning and the role of the customer service

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staff (called 'helpers' by Shaw during the interview), the results show that visitors can use different strategies to learn how to use the technology; they collaborate, as intended by the designers and to the satisfaction of museum managers. The role of the customer service staff is still very important even when they decide to leave visitors alone to explore and collaborate with each other.

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AMPLIFYING THE PROCESS OF INCLUSION THROUGH A GENUINE MARRIAGE BETWEEN PEDAGOGY AND TECHNOLOGY

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Abstract

This study addresses the challenge of inclusion in mainstream schools of learners with developmental and attention deficits and examines the potential of a digital structuring tool, MobilizeMe, to scaffold this process, including the impact and implications associated with the implementation. The study focuses on the discrepancy arising from, on the one hand, the digital and pedagogical affordances for scaffolding the focus learners, and on the other hand, the lack of utilization of these affordances in the context of study. From a case study approach, the paper touches upon the digital functionality of the tool, the pedagogical practice of the teachers and, finally, the consequences of the implementation. Based on the analysis and its findings the study presents a generic model for understanding the elements of the construction of new technology supported pedagogical practices.

Introduction

Learners with developmental and attention deficits, such as e.g. Attention Deficit Hyperactive Disorder (ADHD), Attention Deficit Disorder (ADD), Autism Spectrum Disorders (ASD), constitute a broad group of learners with Special Education Needs (SEN). As noted among others by Almer and Sneum (2009), these learners are challenged in learning and are struggling with "problems such as lack of attention, selective and continuing attention and response inhibition as well as a lack of ability for planning, promoting, strategic thinking, change in attention, flexibility in working memory, self-regulation and self-monitoring" (Andersen, 2015).

Research shows that learners with e.g. ADHD have difficulty performing at the same level as their peers (Barkley, 1998; DuPaul & Stoner, 2003) and that inattentiveness impact their ability to follow directions negatively (Kendall, 2000). This further impacts their ability to remain on task and comply with instructions (Bos & Vaughn, 2002). Learners with ADHD are more likely to obtain poorer grades and lower scores on standardized tests, and they stand a higher risk of dropping out of school than their peers without ADHD (DuPaul et al., 2011). Research emphasize the need for SEN support and supportive structures that offer them an overview of the entire school day and help them keep on track during task solving:

> *The results of this study suggest that when students with ADHD are taught planning skills and strategies, and provided proper support and guidance, they can use a plan effectively and use strategies. This, in turn, can improve their academic performance. (Johnson, & Reid, 2011)*

With respect to digital tools and environments, research throughout the last couple of decades has confirmed the general value of providing structure (sometimes named *virtual portfolios*) in virtual environments; in particular, providing structure for essential prerequisites of a learning process, such as Gutwin et al. (1995), Sorensen (1993) and Sorensen et al. (2002):

> *"The use of a virtual portfolio offers both learner and instructor a general overview and navigational orientation. By acting as a mirror during this evolution of past, present, and future learning, virtual portfolio enhances reflective activity and adds depth to learning" (Sorensen et al., 2002; p.288)*

Such structure can provide:

- *overview* and *(self-)awareness* of space and status of the learning process, for both learners and teachers;
- *perception*, *reflection* and *direction* of a learning process;
- an individual/personal *home* in the digital world;
- a shared understanding between learner and teacher of *status* in the learning process;
- navigational support and future orientation.

Narrowing our focus to look more closely at experiences from using digital technology for inclusion of learners with developmental and attention deficits (the focus learners of this study), our on-going research project, ididakt (Andersen & Sorensen, 2015), documents that these focus learners in the mainstream educational system are still supported mainly by non-digital artefacts and structure solutions (e.g. hand-outs, handwritings at the blackboard, time schedules at the classroom walls, oral instructions).

This paper presents a study, in which a digital tool is used as a vehicle to establish a supporting structure in the classroom for learners with attention and developmental deficits. The study focuses on the discrepancy arising from, on the one hand, the digital and pedagogical affordances for scaffolding the focus learners, and on the other hand, the lack of utilization of these affordances in the context of study. We examine the digital structuring tool, including the impact and implications associated with the implementation in the classroom. The functionality, the pedagogical practice and the consequences of the implementation are given special focus. Section 2 presents the research design, including research method and data collection. While the analysis and findings are presented in section 3, section 4 forms the forum for discussion and presentation of a generic model for realising the power of technology for inducing new pedagogic practice. Section 5 concludes the study.

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Research design

The context, in which the study takes place, is a Danish municipality. A digital tool for structuring, visualisation and collaboration has been used for eight month for focus learners in classrooms at the primary school level (age 6-10) across three public schools. The schools have voluntarily enrolled in a pilot project and identified motivated learners and challenged teachers, who were interested in using MobilizeMe (MM) in a pilot study. MobilizeMe (MM) is a digital supporting tool intended for children, youth and adults with cognitive disorders (e.g. autism, aphasia, Downs' syndrome, ADHD, dementia and mental retardation). MM is able to visualise everyday structures by means of flexible time markers and pictures/icons and through these promote stable situations with less stress and more surplus energy for the learners. It is possible to share the visualised day plans with all stakeholders around the child and enhance collaboration among the supporting individuals (MobilizeMe, 2016)

Method

This paper is based on a three-month case study, which unfolds in a mainstream school context. The study is explorative (Thisted, 2012) and attempts to identify and clarify factors, which either harness or seem to ignore the structural potential of the digital tool in a supposedly including pedagogical practice (McKenney & Reeves, 2012). In the analysis, findings are produced and categorized in four main categories. Subsequently, these categories are used to produce a deeper and more coherent understanding, in order to consolidate and discuss findings in the light of other research.

Data

The case study involves four teachers and six focus learners, all of which have been using MM for between one and eight month. The data related to the learners are collected, using the teachers as instruments. In an overall perspective, the data consists of (a) observations from meetings and workshops, (b) classroom observations, and (c) interviews with teacher and school leader.

The authors participated as researchers in a Skype meeting with the case-initiator in the municipality. The meeting addressed purpose, aim and initiation of the pilot project. Subsequently, researchers acted as participating observers in a face-to-face meeting with school leaders, teachers, and consultants with the purpose of evaluating (a) to what extent the pilot appeared meaningful, (b) the functionality of the digital tool, and (c) the general implementation and its degree of success. In the meeting school leaders, teachers and consultants evaluated the first period of use/interventions with the digital tool. Digital sound recordings from the meeting were transcribed in order to capture and highlight the experienced MM potential through the lenses of the teachers in terms of its value for supporting focus learners as well as identifying advantages and obstacles associated with the implementation of the tool.

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Observations took place at one of the three participating schools in a 3rd grade classroom with three focus learners, all of which were using MM for, respectively, one, three and six month. This was followed by an interview with the teacher in the classroom and with the school leader. Notes from observations and interviews were used in an attempt to assess how the tool was applied, not only in the local practice, but also in the school organisation. Finally, the researchers observed a workshop in the municipality in order to gain insight into how the teachers' were introduced to the digital tool. In the following section the respondents are cited as T1, T2, T3 (teachers) and L1, L2, L3 (leaders and consultants).

Analysis and findings

The digital tool (MM) through the looking glass of the teachers – MM as a tool for the learner

Positive experiences/interpretations

Five focus learners appear to have had positive experiences using MM:

- ability to enhance their understanding of the activities of the day;
- motivation to work through awareness of time and a view to later reward;
- worked more effectively, when timer and rewards are visible ahead;
- appeared more participating and concentrated around tasks;
- appeared less stressed and show less inappropriate autistic behaviour;
- appeared more calm and transmit less stress to peers;
- gained status through becoming a learner, who controlled time.

Although teachers assess that, in general, the learners like to use MM, the items above are not valid for all learners. The degree of satisfaction seems dependent on other situated organisational factors, such as form of the day, interest in relation to subject, etc.

Negative experiences/interpretations

For one learner MM did not seem to generate success, as it appeared that the learner was not at all interested in the digital tool: "It is simply not a success" (T1). However, the analysis suggested that this teacher did not at all understand the nature of the potential of MM.

The digital tool (MM) through the looking glass of the teachers – MM as a tool for the teacher

Positive experiences/interpretations

The teachers saw the learning potential in the tool. One teacher expressed great joy in using MM in collaboration with a focus learner and stated that the use of templates eased the job.

Negative experiences/interpretations

Viewed from a teacher perspective, MM lacked "user friendliness". It was difficult and laborious for the teachers (in terms of functionality) to put up the programme of the day for more than one learner at a time (i.e. to copy a plan), as one plan cannot be shared. This

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problem was further emphasized by the fact that only one of the teachers understood how to re-use a template (such as e.g. a programme of the day). Similarly, the teachers did not possess the skills to edit templates on their own PCs and transfer them to the learner's iPad/MM. The photo gallery of MM got criticized; it takes time to find alternative photos, which did not necessarily function in MM. Another drawback was that the teachers had to wait far too long to gain access to MM. Some teachers' expressed a wish to be able, themselves, to create new user accesses via the national system (UniLogin). The teachers did not understand how to use the time features of MM, and thus, preferred to work with activities that did not have a time frame.

Use of MM in the pedagogical practice

At one school with three focus learners, the teacher created a week programme in MM on iPads for each of them. The programmes for the learners were identical, and it contained only the time schedule of the week. "It is only to stimulate overview" (T2). No activities are associated with the lessons in the plan. Activities were written on the shared whiteboard of the classroom at the beginning of each lesson.

The teachers were aware of the need for further scaffolding of the focus learners. "We have pictograms displayed further upwards. But they do not appear detailed enough" (T3). "The times when I have been successful in programming something else than just the topic, those times I see more and bigger initiatives, as he knows what he is supposed to do. But the problem is that it appears to be very few lessons where it is actually possible" (T2)

Without indications of activity MM was only used to maintain overview of the hours of the day and of the remaining part of the lesson. The learners were supposed to seek info on both iPad and the whiteboard - and according to the teachers, this was hard for the focus learners. They were not participating in the construction of the week or day programme. Their task with MM was to start the watch at the beginning of the lesson. There was no walk-through of the day's programme: "He is not interested to have me showing him the programme, he prefers to sit alone and watch" (T3). The teachers had introduced the focus learners to MM by inviting/motivating them to do something new and smart on an iPad, which could help predict how the day was planned to progress.

MM was utilized isolated from the general practice in the class. It was the extra supporting teacher, who put up MM for the focus learners. MM was not used outside school hours, neither in after-school care (SFO) in the afternoon, nor by parents at home. Parents were not participating in supporting/simulating the focus learners to use MM. For the other learners in the classroom, "Skole-Intra" was used as a digital structuring tool. The teachers were not able to imagine MM "stretched" to be used for all the learners of the class. "That is similar to handing out crutches to all learners. They don't need that." (T2)

The teachers comment that for focus learners it was actually possible "to go in and change things in MM, perhaps out of curiosity or to exert influence on their own schedule" (L1). At the workshop the teachers spoke about how to "close" the iPads, so focus learners would not

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be able to use them for anything else than MM. Teachers are of the opinion that it would stimulate increased focus and prevent focus learner from playing digital games. But it would, of course, create a barrier for using the iPad for other constructive learning activities.

Organizational contextual factors: Implementing MM among teachers as a tool for promoting inclusion

As mentioned earlier, the teachers were not familiar with the functions of MM. Some of the teachers had started by themselves – or with help from colleagues – without having participated in the introductory workshop. "I don't know anything about that, for that I have not learned (T3). "We have just started to use this or that" (L1), "we have just started explorative" (L1), and he offered a workshop: "Then we will set aside an hour" (L1).

The workshop contained a technical walk-through of the functionality of MM: create activity, administration of time, paste images, notes, colour codes, templates, etc. The participants were not familiar with MM, they did not necessarily have codes and did not work with MM during the introduction. After the workshop, they were supposed to continue working with MM. It was expected that the teachers disseminated their experience with MM in the organisation, but there was no concrete plan for this. They had not succeeded in making the video tutorials on the homepage of MM work, nor had they had the time to look at them. They would have preferred a hands-on introduction, where they worked in MM simultaneously, so "they would have time to get to know MM together with an expert user" (T2).

The four teachers were alone facing the challenge of using MM: "It is not our primary focus of development at the school – and neither is it the focus of the class teachers or the teams. There are plenty of other issues" (L2), the leader said, while pointing to other issues and actual initiatives of development.

Organizational contextual factors: The time factor

It became clear that the time-factor permeated everything and was central in relation to:

1. instruction on how to use MM (as the teachers did not have time to familiarize themselves with the tool, and watch videos. What they knew, they had learned through trial-error and general experimentation).
2. daily management, where it appeared a heavy burden to construct individual plans for the focus learners – without being given extra time for preparation.

Consistent in the data of this study the researchers found words and expressions, like e.g.: easier, quicker, re-use, save time, effective, etc., indicating a strong need for offering a module for teachers focusing on MM functionality and how to utilize the pedagogical potential of the functionality of MM.

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Summing up from the analysis it is fair to conclude that the digital tool seemed able to provide focus learners with a supporting structure for promoting attention and engagement. In sharp contrast, it was evident that the teachers did not find time and opportunity for utilizing the structure in terms of (co-)construct individual activities for/with the individual learners. Thus, as a consequence, the structuring and collaborative potential of the tool did not get utilized in the practice observed by the authors. Finally, the organisational frames for the implementation did not seem to offer the teachers sufficient time/space in their work process to become pedagogically competent to identify and appropriately utilize the full potential of the digital tool.

Discussion

From a general perspective, MM was used fairly rudimentary: as a digital version of a school timetable with a timer incorporated at each lesson. It was not by any means an integrated part of the teachers pedagogical practice. It seems that the teachers used MM hoping that it would bring them a "quick-fix". There are indications that the majority of them shared a perception of MM as a kind of "stand alone solution", in which utilization is viewed as a relation/matter only between the system (MM) and the learner, and they do not perceive this relation as a pedagogically job/task requesting the specific competency. The learner is left alone to communicate/interact directly with the system. The teacher was only monitoring if the learner used the technology, but we do not meet any indications that she/he understands herself/himself as an active and responsible player in the challenge of utilizing the digital tool in a pedagogical course of the learner taking advantage of the digital tool in his/her learning process. Only a few examples explored the potential of MM, where the teacher had created detailed activity plans carefully linked to the academically topics and the tasks in the lesson in question. In such cases the teacher detected more engagement and initiative by focus learners.

Neither did we detect any collaboration teacher-learner or learner-learner when using MM. The teacher "brought" the learner a program for the week, instead of developing it in collaboration with the learner. There is likely to remain a large non-utilized potential at a meta learning level, since learners and teachers did not foster a meta learning process through e.g. being in dialogue, when creating content in MM; a dialogue which most likely would have fostered meaning, empowerment and identity for the focus learner (Sorensen et al., 2002; Sorensen, Andersen, & Grum, 2013)

An extra teacher, affiliated with the class, created a general week program for all lessons. She ensured that it was available at the learners' iPads. The other teachers of the classes were not involved in this process and they did not interact/collaborate with each other or with the learners in the classroom in relation to their use of MM. Such a delegated responsibility for implementation of the technology did not invite recognition of an in-built potential for collaboration among an entire team of teachers, in order to obtain a shared and focused initiative for each learner. Therefore, the development of a shared understanding and shared knowledge construction of the teachers was inhibited.

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It is most likely, that MM could have worked as a much more including and less stigmatising tool, if the teachers had been collaborating on the creation of a week program and used this as a structuring tool for all learners at the interactive whiteboard in the classroom. In such case, it would only be necessary to individualise the program on a learner's personal digital platform regarding their individual special educational needs. It would require, though, that the teacher module in MM be modified in a way that allowed teachers with the same contribution to communicate and support more learners. Such modification would probably make the tool much more attractive and tangible in a mainstream school context.

A real genuine inclusion would require that the schools develop a shared understanding of inclusion and gives priority to diversity (McPhail & Freemann, 2005). It would also require that the schools implement tools to facilitate learning for ALL learners. But most off all, it would require schools, municipalities and politicians to be responsible, not only for development of the teachers digital and SEN pedagogical competencies, but also for allocating the necessary settings for this. The teachers would need more than information about possible useful tools. They would need (a) time and support to learn to use the tools, (b) pedagogical support to enrol the tools in the classroom practice, (c) time and space for collaboration with colleagues on a shared initiative, and (d) time for the continuous weekly task to prepare and create individual structures for the SEN learners.

As outlined by Fjuk and Sorensen (1997) it is not possible to establish digital learning practices from fragmented initiatives. Such practices must arise from an understanding of the "triadic entities, technology, organization and pedagogy, as one holistic phenomenon" (Fjuk & Sorensen, 1997). Inspired by this thinking, the authors of the present paper finally present an analytical model (Figure 1) aimed at clarifying, how a certain technology's ability to interfere with, innovate and develop new practices will depend on several simultaneous factors: the functionality of the technology, the pedagogical visions by the teachers (Skovsmose & Borba, 2004) and the organisational settings, in which the technology is to be implemented (Fjuk & Sorensen, 1997).

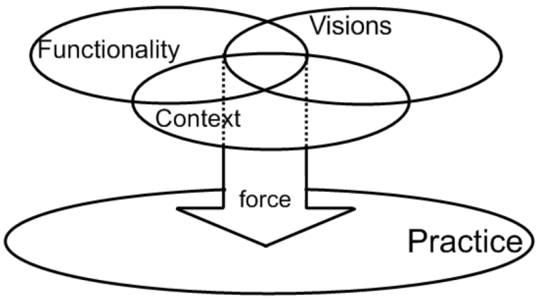

Figure 1 Analytic Model for a technology's ability to interfere with, innovate and develop new practices

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Conclusion

There seems to be an abundance of technologies, which in various ways possess a potential for supporting learning processes. This paper has explored, how one of them, a digital structuring tool (MM), could be implemented and involved in an including pedagogical practice to support learners with developmental and attention deficits to cope with their daily school life. The case study has revealed that, potentially, MM is able to offer focus learners an overview or their tasks at hand, lead them through their task solving, and provide them with an guiding enhance into their learning processes. However, there is no doubt that success will depend on the teacher's capability to utilize (a) the functionality of the technology, and (b) their pedagogical visions and pedagogical imaginations in terms of employing the tool in the organizational context in question, in a way that supports these pedagogical and technological visions.

This leads us to the conclusion that the functionality of the technology at hand, the pedagogical visions and the wider organisational context must be understood as a holistic phenomenon as a basis for assessing the potential of a digital tool for innovating practice. It is evidently necessary for the teachers to receive more pedagogical and technological competence development in order to be able to evolve and generate a pedagogical concept based on a true holistic marriage between pedagogy and technology.

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TRANSFORMACHINES: TRANSFORMING CITY DATA TO ARCHITECTURAL DESIGN STRATEGIES

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An innovative version of the *New Fields of Design and Construction* (NFDC) design methodology course was set in motion at the Postgraduate Program of the National Technical University of Athens (NTUA) last spring. The intention was to experiment with the existing design education framework of learning by doing in an extended learning environment of multiple mediums organized as a representation of the multiplicity of the design praxis. It also aimed at raising student engagement and making students complicit to the formation of the course content.

This process has led to the systematic transformation of the content into both verbal and visual learning units. The course layout was also rearticulated to secure that student performance could be accounted for with a certain precision without shrinking its vast content or limiting knowledge exchange in order to control it.

The student learning outcomes were examined upon the course's completion to verify whether and how e-learning practices can be integrated into architectural curricula. Student attendance rates were closely monitored to register their engagement. The results show increase in course content, high assimilation and continuous interaction between parties. They also show a plurality of approaches toward design, due to the diverse types of students inscribed in the course.

Introduction

The NFDC course engages in mapping the urban phenomena. It then uses the data retrieved by this research to shape integral strategies of urban interventions. It is designed as a process of making visual and conceptual connections of mapping data, social needs and spatial organizations and not just implementing a single design gesture.

This process depicts the essence of the architectural pedagogy of learning by doing where, "the designer constructs the design world by setting the dimensions of a problem space and then inventing the moves by which he/she attempts to find solutions". (Schon, 1987; p.11) Students of this course are given random stimuli. They are then asked to decipher this data by recognizing patterns and contextualizing them into their respective environments. Thus knowledge comes in the form of creating visual and conceptual mechanisms, *transmachines* that can turn random information to logical threads by critically joining elements to form reconstructions of the real.

This course arises from the assumption that there can be only subjective interpretations of reality and within this lays the *learning by doing* architectural educational environment. In this framework, the plurality of student backgrounds has been considered an enormous advantage. Students have been repeatedly encouraged to contribute in any way they think is more appropriate according to their understanding of the environment.

The challenge has been to integrate online components to the course to enrich its content and extend its duration outside the temporal limits of the classroom. It was also intended that students were included in the process of content formation by offering their insights and sharing their references with the rest of the class. In this sense, the term *blended*, applies here to both the use of multiple mediums of exchanging content and in sharing responsibility for determining what the actual content would be with the students.

The course redesign improvised new forms of communication by using online networks and thus facilitating the content exchange between all participants. Additionally, it provided the students with knowledge which comes from the multiple ways of transforming data. This system of producing knowledge out of random ways of interpreting the urban environment fits the very objective of this course; understanding and managing the complexity of the city. There is a cyclical act both in learning and reconfiguring the realities of the city as students realize that any result cannot be reduced to a single definitive form; rather, it emerges as a dynamic calibration of the unlimited complexities of the built environment and how these can be met in the urban field.

This paper examines the process of the course redesign and assesses the outcomes of its implementation. The course deals with the urban scale, a specific area of transition between Egaleo and Elaionas, its interpretation and understanding through the use of a variety of approaches. It starts by illustrating the nature of the content material, the mapping tools and their inherent relation to the aims of the course through illustrative examples. Then it follows the course's dual layout in the online and in class environments and the different networks of communication it established. It continues by describing the process of creating countable structural elements to serve the particularities of each learning environment. These elements will constitute a commonly shared verbal and visual language between the students and the teaching team. It consecutively presents student learning outcomes and assesses their performance in the framework of the blended reconstruction of the course. In the final section, the authors will conclude by highlighting the benefits that this specific e learning environment offers to the students.

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Course Content: Selecting the mapping tools by means of their capacity to represent contemporary urban realities

The course content material consists of a set of mapping tools that examine the extremely complex urban realm in distinct visual and verbal representations. A series of examples of these tools' applications were also employed to illustrate their potential in configuring city fabric.

The tools for urban mapping were selected among the most recent PhD dissertations and Design Research that is currently conducted in NTUA Architectural Postgraduate Programs. They established the main body of the course content focusing on measuring and categorizing the urban phenomena with the ulterior aim to manage their complexity. They stem from both analytical and experiential origins. Their specific manner of reading the city becomes itself a method of both intellect and visual organization offering distinct description logic.

The hybrid learning environment that was fabricated required the integration of the course content in an online platform. The presentations of the mapping tools were disseminated online over a period of ten weeks. During this time, all content units related to each one of them were consecutively uploaded; each week, a new tool would be added to the already existing content corpus. The order of their appearance was random and depended mostly on a balanced collocation based on their level of difficulty.

The lack of a linear, progressive succession of content was explicit of the course's intention to create an interactive model of cognitive development that recognizes the power of background social knowledge and sensory experience (in this case spatial perception as well) to transform the understanding of the world. (Vygotzky, 1986; pp.12-57) It also matched the inconsistency that is inherent in the city, whose understanding has been this course's main objective. No tool was made to appeal as more important than the others, and none of them functioned as a prerequisite for understanding the rest of them. Furthermore, they could acquire different meanings according to subjective readings and through different interpretations. As Downes states:

> *"Knowledge is literally the set of connections between entities. In humans, this knowledge consists of connections between neurons. In societies, this knowledge consists of connections between humans and their artifacts. What a network knows is not found in the content of its entities, nor in the content of messages sent from one to the other, but rather can only be found through zecognition of patterns emergent in the network of connections and interactions." (Downes, 2012; p.9)*

In designing the course content material, the next important step was to contextualize the data retrieved by each tool and relate them to real life problems. To help students comprehend the tools' inner logic, during the online presentations and the in-class sessions, a series of examples of actual applications of the mapping techniques were analyzed in depth. These examples illustrated the tools' potential and inclusiveness and the way they can relate to the

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urban realities. Most of them were study cases included in a major Research Project for the Metropolitan Area of Athens conducted recently by NTUA on behalf of the Regional Administration. The sense of *situatedness*, the interaction between the designer and the environment that determines the course of designing these examples provided enabled a deeper understanding of the tools' methodology (Gero & Kannengiesser, 2002). Linking the students to an urban landscape they were already familiar with allowed for a better perception of core principles. The full report of the Research Project (an online volume of almost 600 pages) was made available to the students as a guide from the beginning of the course to help them navigate the tools' numerous applications.

Course layout: Transforming learning into e-learning by creating multiple collaborating learning environments for the exchange of content

After establishing the course content that was to be transmitted online, what needed to be determined was its temporal connection to the in class sessions and the creation of the networks within which the content exchange would take place. Previous experience had shown that long presentations in class left little or no time for conversation or further elaboration. There was a growing need to develop a different system of communication between the teaching team and the students that would extend the duration of their interaction.

It was decided from the start that in the online environment students would have to go through each unit before coming to class. This decision addressed the need to ensure that the students familiarized themselves with each unit in time so that the quality of their in class presence would be more substantial. Once accustomed to each tools' main terms and characteristics it would be easier for them to comprehend the tools' inner sense and – why not? – start using them themselves.

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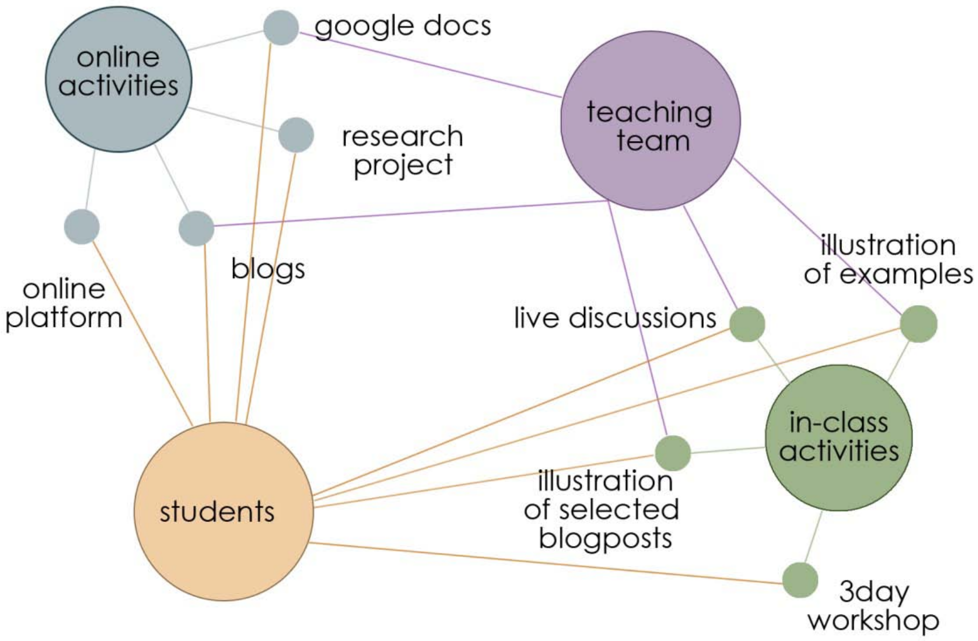

Figure 1. Online and in-class content layout and exchange paths – The figure shows the course's main features and the reciprocal character of the teaching team and the students' communication paths.

The in-class aspect of the course developed during the weekly meetings where all parties were able to exchange views and argue on the content. During this time students were able to address any possible questions raised from their online attendance. The teaching team used the time to contextualize the material transmitted in the week's course and to check on the students' comprehension of each unit by illustrating examples of applied cases. Tutorials' demonstrations of software were also shown to illustrate the synergy of the mapping with digital programs. In addition, some of the most interesting student blog posts were selected each week and discussed further with the students.

The course layout was conceived as an open system of content exchange in multiple intermingling environments (Figure 1). This way, the students could get in touch with the course content in the manner that best suited their learning habits. During the week's time they had to prepare for their in class attendance the students could watch the online content as many times as they wished; browse through the links suggested by each speaker; consult the Google docs established in the course; study the Research Program; download and experiment with relative software and tutorials. In parallel, they could also conduct their own independent research on other mapping techniques; make their findings known to their fellow students through their own blogs; check on what their mates had already uploaded.

One of the main objectives of the course was to create a learning process the students themselves could moderate based on the grade of their involvement. Following Freire's libertarian educational model, teachers and students have been considered partners in the learning process "where they both exchange roles and reflect upon transforming the world"

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(Freire, 1970; p.76). The course setup acclaimed student collaboration and their active engagement and expected the teaching team to always remain alert toward student feedback.

This attempt also agreed with the core principles of the "connectivist" educational practices of massive open online courses, where learning consists of the ability "to construct and traverse networks of connections" (Downes, 2012, p.9). The fact that the course was elective established a sense of synergy from the beginning where both parties entered this venture knowingly that they would be sharing responsibility for its actual development. That was one major shift in rethinking the traditional format; making everyone accomplice to the process (Figure 2).

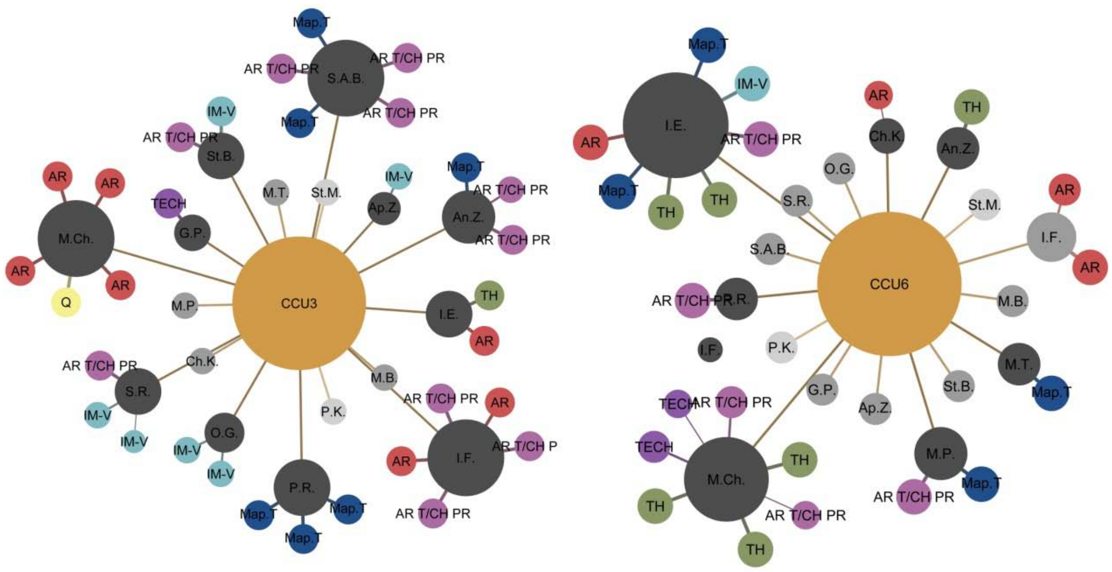

Figure 2. Student blog post activity in regard to course content for weeks 6 and 9 of the course – Yellow circles represent course content transmitted at that time; grey circles represent; their size variation regards the number of posts published during that week. The rest of the coloured circles around each student represent the various types of blog posts he/she published in regard to content. (Articles in red, essays in green, mapping tools in blue, images and videos in cyan, artistic of architectural projects in magenta, technology related posts in purple)

At the end of the semester the students participated in a three day design workshop where they were asked to use the course content tools discussed in class and online; or form their personal interpretation of the tools; or use the tools as inspiration to establish their own, to map the area between Egaleo and Elaionas situated at the core of the Athenian metropolis. The area that was indicated to students presented an interesting discontinuity of the urban tissue, a fact they were called upon to analyze and assess. The aim was to make students work with whatever tool caught their attention, combine tools, or even come up with a new one more suited to investigate the area under examination.

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Course articulation: Transforming learning into e-learning by creating countable verbal and visual structural units

The material that was to be transmitted as online content underwent a series of transformations in order to conform to its new medium. The original three hour long in class presentations were narrowed down to forty minute online lectures that were further dismantled in maximum seven minute videos. Additional material was also inserted in the form of images, diagrams, online articles, software, tutorials and references to related bibliography for whoever cared to scratch the surface. This process of condensation limited the course duration but it also interfered with the course core components; its visual and discursive expression respectively.

As for the course's verbal vocabulary, a series of terms defining each tool was introduced and systematically used to describe the design approach suggested by each one of them. Clusters of words in the form of terminology especially configured to verbally represent the inner structure of description logic were now promoted to key structural units of the course.

A lexicon was set up to include those terms in an open to all Google document that run parallel to the course and served as a hybrid dictionary. The students could consult it to look up the meanings of the terms used in the course. They were also given the freedom to alter whatever felt unsuited or irrelevant. All definitions were treated as suggestive and therefore incomplete and open to translation. As the course advanced students were actually encouraged to modify them, add more to them, or even drastically transform them to fit in with some missing element of meaning relative to their line of thinking. Thus the course content was open to interpretations; alterations; highlighting its openness and its resistance towards entrenched perceptions.

Apart from the organization of the course verbal elements there was the need to also transform at least a part of the visual representations of the course into distinct structural units as well. As was mentioned earlier, the course was particularly oriented toward the formation of spatial design and the constitution of the argumentation that supports it. So in the course's overall development, the visual language drew more from schemata of thought enriched by additional sensual or digital spatial data. The visual medium parallel to the verbal "offers structural equivalents to all characteristics of objects, events, relations i.e. readily definable patterns, of which the geometrical shapes are the most tangible illustration" (Marda, 1996; p.257). The purpose has been to depict urban reality by featuring selected urban entities and their interrelations in open schemes. These would be susceptible to change and interpretation by whatever means were necessary and available to the student/designer. These representational schemes became the visual structural units of the course, for they were able to capture meaning in purely design expressions.

In addition, as some of the tools presented in the course make use of particular software, the physical expressions of their argumentation are often founded on the diagrammatic structures these programs produce. These representations result from simple or more elaborate

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algorithmic coding and often create their own complex graphic ontology that addresses the particular entities they try to decipher. They too, assisted the communication of meaning and they were intensively adopted by the students.

Course earning Outcomes & their Assessment: Transforming data into knowledge by examining the incorporation of the structural content units in student projects

The dual presence of the course both online and in-class creating multiple layers of communication and the hammering of its content to countable structural units of meaning, verbal and visual, allowed the teaching team to assess almost every aspect of the students' performance.

Instead of seeking a uniform audience, the course made the most out of student diversity, using their individual profiles to shape different description logic and expressions. Despite the necessity to control the learning outcomes this course did not ask students a given product; instead, it encouraged them to shape their own subjective threads of thought by linking data and interconnecting their representations accordingly. Their projects represent a multiplicity of design approaches and reveal the subjectivity of their argumentation.

The online platform allowed a close monitoring of student attendance as "increases in the amount and kind of educational data offer researchers new opportunities to observe, analyze, and ultimately improve the learning process" (DeBoer et al., 2014). The data gathered throughout the duration of the course offer a precise insight of the number of their weekly visits and their overall on line attendance habits.

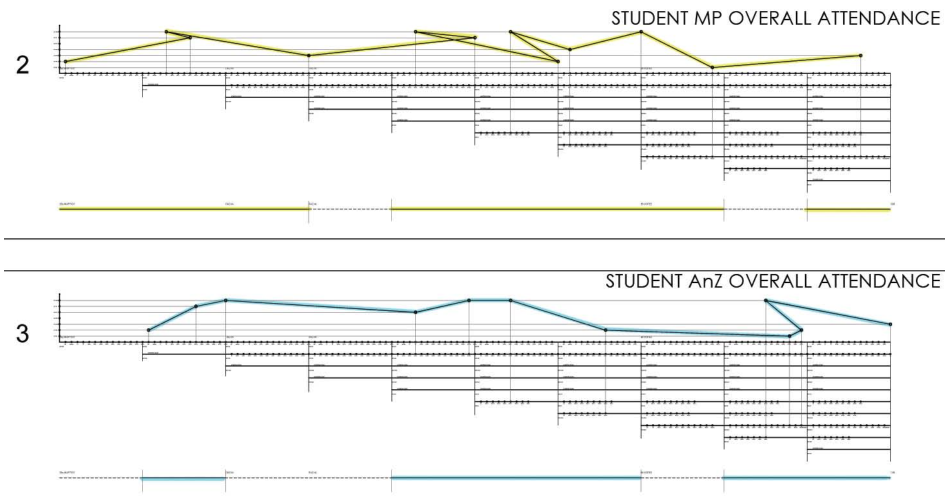

Figure 3. Student online attendance charts –The coloured lines show the diversity in the overall student online attendance habits and preferences. The crooked lines represent their learning paths, while the straight lines in the bottom represent their weekly visits.

Most importantly, through the use of the online platform, students were given the chance to follow the course at their own pace and deepen their understanding of whatever seemed more intriguing to them. The students' registered online movements are shown in their individual

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attendance diagrams. As seen even in this limited sample of a total of seventeen students no two look alike. Attendance charts vividly illustrate the students' individual preferences towards some course units and their repeated visits to videos they watched for several times (Figure 3).

One of the most interesting aspects of the course layout, however, lay in the online student content transmissions through their own blogs. Their posts were accounted for and further analyzed in regard to the course content. An overall amount of a hundred and forty six blog posts uploaded in ten weeks' time included the presentation of at least twenty additional mapping tools; almost forty articles on assessing mapping data; a vast documentation of artistic or architectural projects that embedded major principles of the course content (Figure 4).

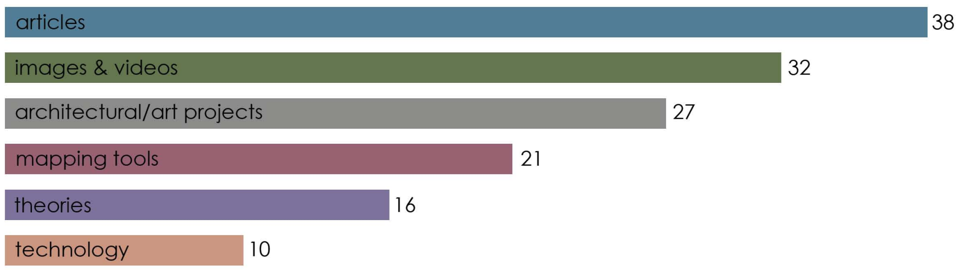

Figure 4. Type and quantity of student blog posts

This additional communication channel has helped the less active students to express themselves and share their views with the others. It also kept the in class discussions running throughout the week until the next meeting as students uploaded more material related to the ongoing arguments. The blogs in particular have proved beneficent in this regard by continuously linking individual student interests with the course content and with the rest of the class. The clouds of interaction vividly illustrate this constant exchange.

The three-day design workshop on the other hand, realized at the end of the semester, determined the sum of the course deliverables and the final project students would be rated upon. Each student was asked to map the given area between Egaleo and Elaionas and deal with its complexity in the scale they desired, eventually bringing to life their completely different perspectives. The students were asked to implement this task by using both visual and verbal tools in the way these were presented throughout the course.

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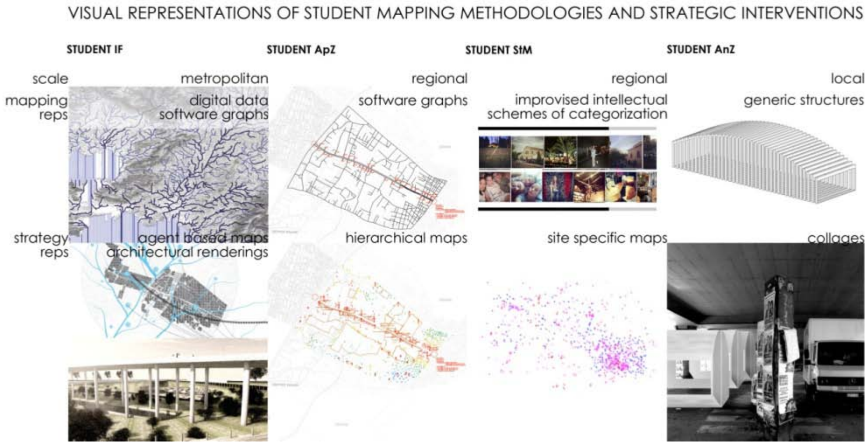

Figure 5. Samples of the students' visual representations during the workshop – One can see the way the implemented their mappings in Egaleo and Elaionas and the varying design and mapping scales they used to approach the subject as well as the representational mode they chose to illustrate their proposals.

All student projects were consecutively evaluated in regard to their affinities in terms of their visual and verbal expressions with the course content. Despite the divergent mapping methodologies that were applied and the different scales of intervention, all student projects were represented mostly through diagrams and graphs or generic architectural forms. The visual expressions of the student projects were immensely influenced by the course content tools' inner sense as well as the software that supports them. All of the students illustrated their findings using intellectual schemes from the given course toolbox, while some of them even invented new mapping tools or new representational models for the mapping data they retrieved (Figure 5).

The other aspect of the evaluation of student learning outcomes dealt with their verbal argumentation of their projects. A thorough analysis of the two page essays they were asked to submit along with their design proposals highlighted the frequent use of the course terminology as this was presented in the Lexicon and introduced by the mapping tools throughout the duration of the course.

Finally, the affinities between student posts and delivered projects were investigated. The clouds of student blog post interaction illustrate their constant exchanges of online content throughout the duration of the course. They also reveal the similarities between student interests and uncover the blog post threads that directly or indirectly influenced students' workshop projects (Figure 6).

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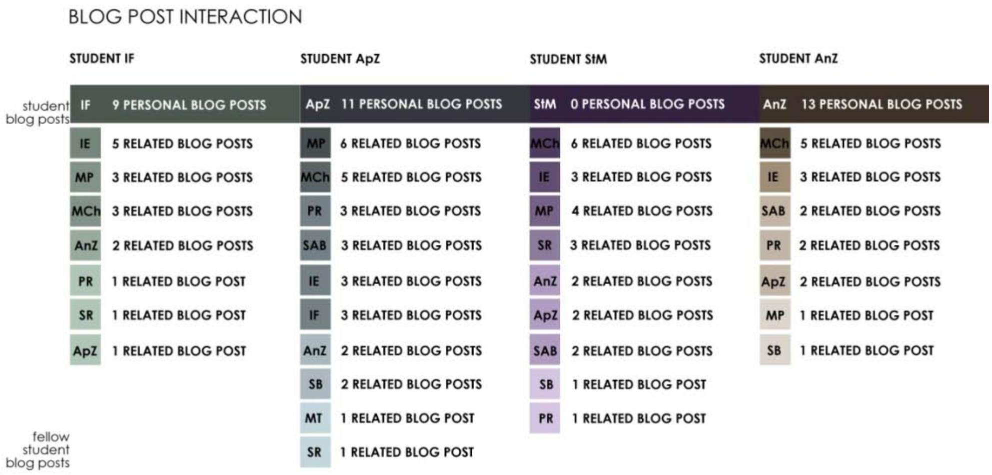

Figure 6. Student blog posts affiliations in regard to their final workshop project

Conclusion

Despite the theory supported by many that architecture is well off without permanent or accurate boundaries (Baird, 1996), its fluid, dual character, visual and verbal, makes it difficult to set the limits in an educational curriculum. Let alone using open online learning environments to do it where it is impossible to fully control the flow of information. The learning by doing architectural educational model, however, requires the students to form their own interpretations of reality. And the course's online presence could not jeopardize this; instead, it could actually facilitate it by making students active agents in the learning process.

The increase of stimuli and communication channels between the interacting participants was what this course set to create from the beginning. The coordinators provided the basic course content, the learning environment and a system of data exchange formed by countable visual and verbal units. The process included:

- The selection of innovative mapping tools by means of their capacity to represent contemporary urban realities,
- The dependence of the course layout on multiple collaborating learning environments for the exchange of content,
- The creation of the course articulation by determining countable verbal and visual structural content units to disseminate the information to all participants.

A thorough analysis of student engagement as it has been registered through the monitoring of their activities reaffirmed that students do not learn in the same manner. In this regard, the flexibility of this hybrid course that did not direct them towards specific approaches enabled the students to pursue their own learning paths without missing on the content.

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The student learning outcomes demonstrated how the transformation of the course content into visual and verbal units was assimilated into student projects and how the students used the terms and the representations shown to them to argue their own work. It also showed how the e-learning practices that were adopted in this class facilitated the exchange of information and activated student interest. The students were challenged to express themselves in more than one ways and they responded to this task. They contributed to the content through the online environment multiplying the material offered.

Eventually, what this process generated was a course whose content was determined by both parties. The quality of the exchange that took place was in that sense, unique. The course cannot be repeated as such for a second time. The determination of its content will always depend on the participants' individual profiles, their preferences and their level of interaction.

This discovery linked the course formation directly to the complexity of the city itself. Just like the course depended on its participants to obtain its final form, the mapping and managing of the urban phenomena depended on the personal hierarchies of the people involved in realizing them. What was created was a direct metaphor, a mirroring of one process onto the other.

Future plans for the course include the enrichment of the online material with additional tools from other disciplines as well and the inclusion of this year's projects to the content corpus as a reference for the future students. More emphasis will also be given to software tutorials and online data exchange.

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CURRICULAR DEVELOPMENT AND ICT: FROM TECHNOLOGICAL DEFICIT TO METHODOLOGICAL DEFICIT

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Introduction

The way the main aspects of the information society are dealt with in school and how the young are being prepared to act socially and in such a professionally fluid and constantly changing context are crucial questions that today's teachers and educators cannot ignore.

As several national and international studies seem to indicate, even in wealthier countries with a long history of teacher training, there remains a big deficit in how teachers are prepared to exercise their profession, especially from the methodological point of view (Costa, 2008; Franssila & Pehkonen, 2005; Wallin, 2005). Not only does the use of digital technologies in educational practices continue to be much lower than one would expect, in view of the investments made, but there is also a glaring lack of guidance as regards how they should be taken advantage of, which leads to irregular usage that is not in accordance with the main theoretical principles underlying the constructivist framework of these countries' national curriculums (Costa & Peralta, 2006).

Preparing teachers to use the digital technologies in their educational practices is not merely a technical question of how well they master the technologies. Moreover, the way this issue usually ends up being tackled in conventional training gives us strong evidence that the strategies for professional development implemented are ineffective from the methodological point of view. In other words, even after attending the training programmes provided, the teachers and educators continue to have big doubts about what ICT can be used in education, and why and how ICT can improve their pupils' learning (Peralta & Costa, 2007). We believe the essential question lies in the way the teacher training has been designed and its obvious ineffectiveness to properly prepare the teachers (Costa, 2008; Costa et al., 2006).

Given the diversity of the curricular areas in which the technologies may be used, the different phases and stages of teachers' careers, and the wide range of perspectives they have about what teaching and learning comprises, and how to incorporate ICT into this process, we always considered it strange that these multiple factors were not specifically incorporated into teacher training. Given that these differences are of crucial importance in the teaching practices of teachers and educators, what we propose is the outline of a framework of thinking that will allow us to identify and characterise the different kinds of pedagogical intervention using ICT that can be useful when it comes to designing the training.

Background

In Portugal, as the has made obvious by studies on continuous training, *learning the tools* was an aspect that was strongly focused on in the initiatives organised by PRODEP – Educational Development Programme for Portugal (Brito, Duarte, & Baía, 2004; Santos, 2001). Although one can speculate about the reasons behind such a low incidence of training initiatives in which the trainer would expose the teachers to the pedagogical use of the technologies available (only around 10%), we believe that this may result from the convergence of two easily verified facts.

We refer, on the one hand, to the absence of structured programmes specifically designed to prepare the trainers charged with carrying out the training (Felizardo, 2012; Felizardo & Costa, 2012), meaning it was left to their own initiative to discover and explore the tools as and when they appeared. However, we believe the chief reason behind this usage, and which in most of the cases we have discovered, is simply the interest and curiosity triggered by the technological development in the area of information technology, above all shown in the attentive monitoring of the innovations that have arisen and that can be used.

Although one may think that given their preparation and pedagogical concerns, the fascination with the technological potential in these early adopters would give them a strategic advantage to transfer this potential into the teaching and learning field, this generally did not happen. It was not the case the majority of the time, although the trainers continued to be granted the individual freedom as to what specific guidelines should be transmitted to teachers in this area, with the advantages and disadvantages that such a flexible and liberal approach entailed.

A first factor is linked precisely to the fact that this approach is in itself inconsistent and erratic, and above all prisoner to the pressure exercised by the technological industry and by the fast pace at which new tools are launched onto the market, not even allowing time for proper pedagogical experimentation and assessment.

This aspect is intrinsically linked to a second factor derived from the absence of a framework that would allow the trainers to go beyond teaching the tools to the teachers who, for an array of reasons, seek to initiate themselves in information technology. While on the one hand it would seem to make sense to start this initiation by learning the tools, given the state of almost absolute technological ignorance of most of the teachers and educators, the fact that there is no suitable framework in place naturally gives rise to situations where the topics taught are repeated and are unsuitable given the progress the teachers have made, and it also does not allow an articulated and systematic coverage of all the potential interested parties in each particular context.

A third factor, a consequence of the previous two, is of capital importance in our opinion. It derives from the fact that there has never been a forum for a systematic discussion of the pedagogical and didactic issues involved in the introduction of the new technologies, both for the teaching practices and at the level of the schools' management and functioning structures.

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Apart from a few exceptions, such as the reflection working group set up as part of the MINERVA project (Ponte, 1994), or initiatives of a more limited geographical or temporal scope (Ramos et al., 2002; Dias et al., 2002), we can say that over the past twenty-five years of work regarding the integration of technologies in Portugal's schools, the pattern has been one of a strong focus on f the practices without any prior theoretical reflection, with a glaring absence of a systematic reflection about these practices that could underpin and consolidate the most profitable and significant initiatives that have been implemented in real teaching and learning situations.

If we add a lack of clear guidelines about how to use ICT in school, which is the responsibility of the decision-making authorities from which one would expect a strategically structured action, we find a fourth factor explaining the superficial nature and inconsistency in the proposed pedagogical use of ICT, not least because of the lack of assessment, consolidation and dissemination of the positive results of the initiatives carried out over the years.

We are referring not only to the centralised authorities responsible for defining the curriculum, but also and especially to the institutions in charge of the initial training of teachers and educators which, as we know through studies published in 1996 and 2004, never looked upon the issue of introducing ICT in schools as a crucial strategic aspect for the development of teachers (Ponte & Serrazina, 1998; Matos, 2004), the schools themselves, and therefore the country.

Although one cannot ignore the role played by different Ministry of Education departments and services to facilitate the introduction of ICT, through several incentives to purchase and increase the use of computers, often based on the presentation of well thought-out projects by the teachers and schools (Costa & Jorge, 2011; GEPE/ME, 2007; DAPP/ME, 2004), we believe too for too long the educational community was provided with no clear, consistent and well grounded vision about the role of the technologies in education (Cruz, 2010).

As we have argued in other areas (Costa, 2003; 2004; 2008), one would expect more determination in creating the conditions for an indispensable debate about the expectations and challenges, in terms of innovation and change, that the potential of the digital technologies in a network engenders for schools. After all, it is precisely the school, in articulation with the teacher training institutions and the research centres, which is the ideal place to converge the theoretical and practical knowledge needed to bring about structured and sustainable innovation and change.

Indeed, we cannot think of a more appropriate place to carry out this reflection, especially if we want a systematic analysis of the issue, and the respective theoretical foundations, as sustainable bases for the changes that the use of ICT supposes and implies when one aims to go beyond the mere automation of traditional practices (Weston & Bain, 2010).

If we want to make technologies the drivers of change in schools (ETS, 2007; Castells, 2002, 2007; Moura & Carvalho, 2006; DAPP/ME, 2004), what is at stake is the need for changes, both in conceptual terms regarding the learning and a curriculum that was built for the paper

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and pencil era (Valente, 2011; p.30), and in terms of the teachers and pupils' time and space (Fisher et al., 1996). To sum up, the questions are what should be learned in schools today and how should it be taught, or to put it another way, what is the role of school in today's society.

Types of ICT usage for curricular purposes

As one can conclude from many studies in this area, the issue of using technologies in school is essentially a pedagogical question. One of these studies (Abrami et al., 2006) aimed to measure the impact of technology on learning on a global scale, over the last forty years, based on second-order meta-analysis, i.e. taking as a reference a vast set of meta-analyses carried out in different parts of the world. The conclusion was that enhanced learning, when it occurs, is not explained by the kind of technology used, but rather mainly by variables of a pedagogical nature and how each of the aspects inherent to the organisation and implementation of the teaching and learning is tackled. In other words, the methodological aspect.

Although one can cast doubt on the results of these studies looking at the effects on learning of using ICT, because they are solely based on the creation, artificially to a greater or lesser degree, of experimental devices to be compared with "technology-free" classes, it is interesting to note the way they open up a diversity of dimensions and factors that are at play in the study of different pedagogical situations that used technologies.

The same conclusion can be derived from the results of the ACOT (Apple Classrooms of Tomorrow) project, one of the biggest studies ever carried out about how teachers learn to use the technologies (Sandholtz, Ringstaff & Dwyer, 1997). It was a study of a longitudinal nature, in contrast to the aforementioned experimental studies, and covered a sufficient time-span for multiple and wide-ranging explorations of the computer in the classroom. One could observe that the changes in the teachers' practices were above all linked to the methodological alterations that the teachers had time to test out as they gradually introduced the technologies into their classes (Hayes, 2007). Therefore, it is through the very process of experimenting new strategies for teaching the pupils, and reflecting on what works and what does not work, and about what adjustments need to be made, that the transformation takes place.

Although other variables have been identified and may also be present whenever considering the use of ICT by teachers or educators, such as personal experience in using the technologies and the training received (Wozney, Venkatesh, & Abrami, 2006), the motivation and confidence to use the computer (Peralta & Costa, 2007, Chen & Chang, 2006), the perception about the benefits of the computer (Sang et al., 2010), the fears and anxiety about having to change their practices (Kay, 2008, Mueller et al., 2008, Wood et al., 2008), we believe there are two nuclear dimensions to be considered in the analysis from a curricular viewpoint: on the one hand, the teachers' pedagogical conception and stance, and on the other hand, the way the teachers understand and use the technology for the learning objectives.

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In the belief that these two dimensions are of crucial importance in the teaching practices of teachers and educators, we propose outlining a framework of thinking that will allow us to identify different kinds of pedagogical work with technologies, so as to facilitate the guidance to be subsequently developed in the training of teachers and educators.

As can be seen in Figure 1 (Orthogonal reference tool to analyse the kind of ICT uses for educational purposes based on the teacher's pedagogical conceptions and the function attributed to the technologies), based on the variations that can exist (a) in the teachers' pedagogical conceptions and the way they usually organise the teaching and learning process, conjugated with (b) what they know and think about the technologies and how they use them with the pupils, we are able to identify and characterise four different kinds of pedagogical interventions when using the ICT for curricular purposes.

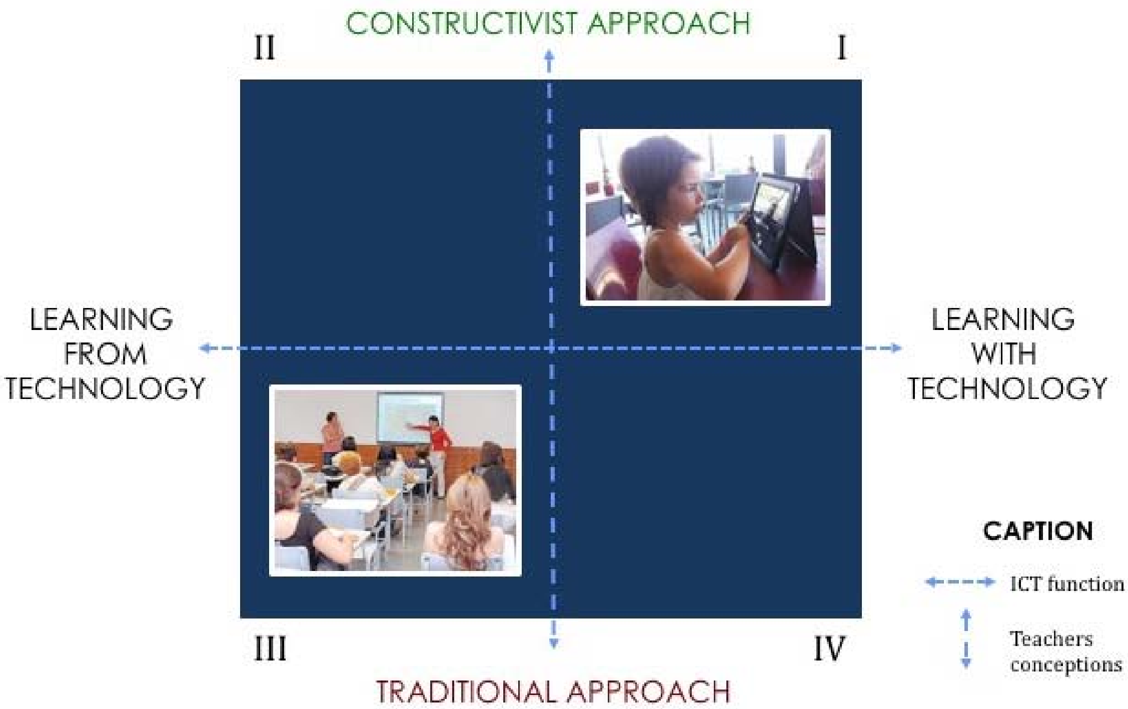

Figure 1. Orthogonal reference tool to analyse the kind of ICT uses for educational purposes based on the teacher's pedagogical conceptions and the function attributed to the technologies

The four kinds if ICT usage found correspond precisely to the four quadrants defined by cross-referencing the two orthogonal axes, one representing the continuum referring to the *teacher's teaching model*, ranging from constructivist at one end to traditional at the other end, and the other representing the continuum referring to the *type of technology use*, ranging from technology to transmit information (learning from technology), to technology as a tool to aid and support the pupil's thought processes (learning with technology).

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In quadrant I, we can succinctly describe the teacher as someone who knows and uses tools that help him to think, along the lines of what Jonassen labelled *cognitive tools* (2007), but also a teacher who systematically reflects on what he does and how he does it, and based on this reflection introduces changes whenever necessary, thus improving his practice. This is a teacher who centres his activity on the pupils, granting them a leading role in their learning.

In quadrant II, we are in the presence of a teacher who also centres the activity on the pupils and reflects on what he does on a regular basis, although he does not yet have knowledge about the specific tools, or how to use them appropriately to encourage, develop and enhance the pupils' ability to think, create, solve problems, express themselves, communicate, interact and collaborate with others.

In quadrant III, the teacher understands and uses the technology essentially to support the process of transmitting knowledge to the pupils, whereby the computer is largely used as a substitute and mediator, be it in the transmission of knowledge or in the way the learning is consolidated, through exercises, educational games or other kinds of strategies, essentially reactively responding to the stimuli presented.

Finally, in quadrant IV, we have a teacher who knows that tools are available that may be used to support and expand the thinking process, but who ends up using them inappropriately, with no consistent theoretical basis underpinning this goal, as well as not doing so in accordance with his own traditional method of teaching.

Advancing in the analysis of the proposal presented herein, and holding up quadrants I and III against each other, one can glean two opposite kinds of ways the technologies are used. One is a *rich* usage (quadrant I), compared to *poor* usage (quadrant III), although we believe we cannot discern, in either case, inconsistency between the kinds of technology usage and the theoretical principles underlying the model of work followed by the teacher.

In the first case the teacher values his pupils' work with technology, enabling a *rich* learning, and is therefore the most powerful usage one can implement in the school. It is in accordance, indeed, with what some authors call "learning with technology" (Papert, 2007; Jonassen, 2007). As can be seen, this is a much more ambitious perspective, but also comprises a much more demanding task both for the pupils and the teacher.

It is especially challenging for teachers, who have to leave their comfort zone and make a big effort to bring about the changes that this perspective implies in relation to the ways teachers usually work when in the opposite quadrant, i.e. quadrant III.

From the point of view of the pupil's learning and development, it is the perspective closest to what is recognised as being the across-the-board digital skills inherent to citizenship in a society heavily based on information and knowledge. Deep down, it is a question of thinking about the pupils as capable of analysing, assessing and deciding about the problems they face, pupils who use the digital technologies to access the information they need and are able to select in line with previously established criteria, pupils able to reflect on what they are

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learning and how they are learning, in order to develop autonomous and self-regulated learning strategies, pupils who are able to communicate, interact and collaborate with others, pupils who can express themselves, who can imagine and create using the different forms of representation and the respective combinations that the digital tools allow them. To sum up, we are talking about pupils for whom it make sense to put the technology, which they already use routinely and skilfully, at the centre of the school activities and objectives.

In terms of innovation, change and transformation of the teaching practices, it is also at the top of the diagonal that connects these two quadrants that the maximum point is located, which we can call the "transforming potential" of the ICT. In other words, where it is more likely a teacher is open to change, recognises what has to be done to bring this change about, and is willing to make the effort this implies, constructing a vision of the point of arrival, when we are talking about a teacher or educator who is markedly constructivist.

From technological deficit to methodological deficit

As a result of this line of thinking, and as shown in Figure 2 (Type of ICT usage for curricular purposes, types of deficit and transforming potential), one can also draw conclusions about two kinds of deficit that should be distinguished (ISTE, 1998), given their direct implications for those responsible for designing the training: on the one hand we have what is usually recognised as "technological deficit", which we define as the gaps in knowledge about the technologies and how to manipulate them; on the other hand we have what we have called "methodological deficit", which we define as gaps observed in the level of pedagogical knowledge about these technologies, i.e. what they are for and how to use them to improve and consolidate the pupils' learning. This final factor has crucially important implications for the design and implementation of the curriculum, and therefore calls for greater effort aimed at bringing about professional development, both from teachers and training managers.

Despite the differences that we can anticipate between the two different kinds of technology usage deriving from each of the four quadrants, we believe there is no discernable deficit in quadrants I and III, simply because we can accept that there is consistency between how the ICT are used and the kind of dynamics underpinning each of the models in question, the constructivist model, in quadrant I, and the traditional model, in quadrant III.

Considering the teacher in quadrant IV to be a traditional teacher, who knows how to manipulate the technology and uses it, but who in doing so uses it inappropriately relative to what one would expect in the working model where he is located (theoretical-methodological inconsistency), we believe we start to see the emergence of a prevailing "methodological deficit", as we have labelled it. This is a teacher who can benefit decisively from being made aware of the inconsistency between the type of teaching he gives precedence to and the way he uses the tools. He should be encouraged to search for more appropriate technologies and to start deliberate experimentation and transformation of his current practices, built on the knowledge he has about the tools, which should not merely be substitutes for the transmission of knowledge.

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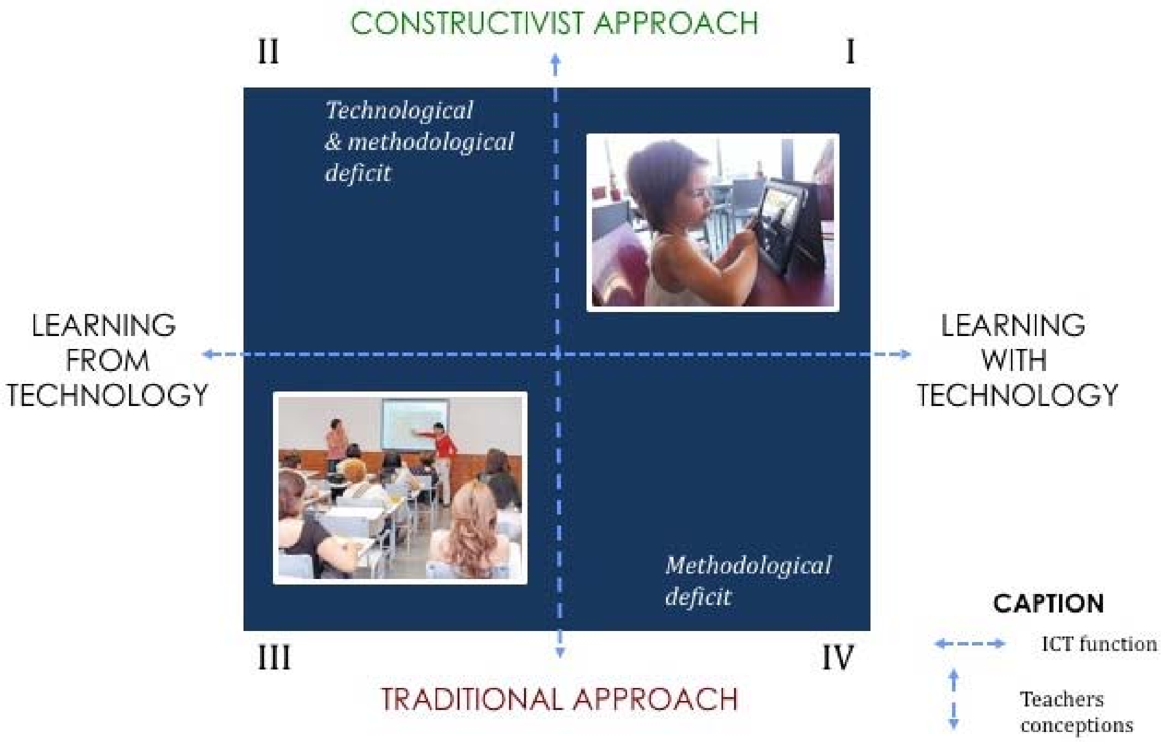

Figure 2. Types of ICT usage for curricular purposes, types of deficit and transforming potential

Looking at technology from the point of view of its potential to transform current teaching practices involves first of all the professional decision to want to change direction to a model that is clearly centred on the pupil and where the pupils are made to take the initiative, and the teaching is not simply laid on for them. As well as being a process that demands a lot of time, it implies a conception of using technology that is not aimed merely at replacing the resources traditionally used to teach and learn. It implies, in contrast, a perspective aimed at discovering new and different ways of doing things, preparing the young so that they themselves can contribute to the innovation required to solve the problems they will face in the future.

In quadrant II, we believe the inconsistency between the kind of tools used and the constructivist teacher's working model is of a different nature to the previous one in terms of methodological deficit, as it is not so much a question of inappropriate use, but mainly down to the lack of knowledge about the tools that can expand and enrich the work the teacher carries out with his pupils, encouraging relevant and significant activities for these pupils, therefore affording them the aforementioned centrality in the learning process. We are therefore in the presence of a methodological deficit in close connection with a technological deficit which, as defined above, manifests itself precisely in the gaps concerning knowledge of technologies and how to manipulate them. In practice, the work that would have to be done with the teachers located in quadrant II would have to involve first the learning of tools that could be included in the category of "cognitive tools", so that afterwards, and only afterwards, can work be carried out as regards the methodological aspects, i.e. how should these

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technologies be articulated and integrated into the pupils' activity: when is it pertinent and useful to use them, and for what specific purposes, in what context, for example, in terms of time and space, what forms of social organisation should the work involve, and what role should the teacher perform, etc.

Final considerations regarding the design of training

When the goal of the training is to prepare the teachers to use the information and communication technologies in their teaching practices, most of the time we observe situations in which teachers and educators are viewed as a single entity, regardless of their teaching area, their professional experience and their conceptions about teaching and learning, or even their prior knowledge and specific experience in using technology for curricular purposes.

These and other variables affect the work of the trainers, making it very difficult for them to adjust the strategies and activities to the individual needs of the teachers doing the training, both from the point of view of their knowledge and technical skills as regards the operational and functional manipulation of the tools, and in terms of the particularities deriving from the subject area they teach, but above all with respect to the way or ways they can be integrated into the teaching and learning process.

While the first of these variables has not given rise to many problems in implementing the training, given that it is not the technical issues related to learning the tools that cause the difficulties, the same cannot be said when the idea is to work with teachers and educators on the pedagogical exploration of these tools, i.e. how to use them for curricular purposes.

The proposal presented here intends to construct a tool enabling the training managers, and the trainers in particular, to prepare their action more appropriately and effectively, based on a prior analysis of the needs of the trainees they will be working with in each situation. In other words, the training should be based on the articulated analysis of the two dimensions proposed herein: on the one hand, the conceptions and current pedagogical practices of the teachers and educators involved, and on the other hand their conceptions and their current practices of using technology in the teaching and learning process.

Based on this analysis, we are convinced that each trainer will be in a better position to adjust his own training and guidance strategies, in accordance with the four different types or profiles we arrived at, adapting them to what each of these profiles could represent for each trainee or group of trainees, namely in terms of distinguishing between the two kinds of deficit identified: the technological deficit, which above all calls for the learning of the tools, and the methodological deficit, which as we have seen, involves not only learning how these tools can be incorporated into the school work, but also presupposes a change in attitude that requires time and effort by the teachers and educators, especially if the goal is to explore the pedagogical practices that actually take advantage of the enormous pedagogical potential of ICT, showing a willingness to experiment and create new and more stimulating teaching and learning environments. And it is based on this work of exploring, experimenting and

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reflecting on what works and what does not work, that professional decisions should be made that force a move towards innovation, change and transformation of processes.

Although deriving from empirical work and reflection over a number of years, the framework of thinking presented herein to read and understand the needs of the teachers in the ICT area, and to support the decisions about which strategies trainers should select to prepare them, it is merely a proposal provided for all who would like to and are able to put it to the test in a real training context.

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USE OF BIG DATA IN EDUCATION EFFICIENCY ANALYSIS

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Structure of the paper

This paper starts by painting a global picture of social media use among students and presents some finding of a survey in order to show how commonly is the topic of teaching and learning represented in discussions. Secondly, it presents the Big Data paradigm. Thirdly, the paper offers a way of determining the sentiments about educational applications using Big Data analysis. Finally, it brings some conclusions.

Introduction

We live in an information society where more and more interaction takes place in network environment. Our learning activities become digital and e-learning is not a novelty anymore. Several elements of our lives are stored in clouds and analyzed by computers and software. Non-formal and informal education is becoming the new paradigm and due to the nature of the internet and e-learning, more and more people can access knowledge. Voices and opinions which have been silent until now have grown louder. Open discussions have been initiated on topics of learning, teaching and education in general. As the internet and Web 2.0 services in particular are the most democratic platforms where arguments can be made that it is no wonder that many of the students state their opinions online in forums about their instructors, teachers, universities, about the curriculum and lectures. Some of them use social media to express their feelings about education, about the examination systems of learning management systems (LMS). The same time educational platforms become more and more open. MOOC courses are offered for free all over the world, where students get knowledge, but the same time give important insights and the data collected this way is really precious to determine whether a course is successful or not.

Using social media is nowadays an integral part of our information society, especially in case of those members who belong to Z generation that feels free to express their opinions or to become a prosumer (producer + consumer). It is typical for this generation to be always online and immediate share a huge amount of information that can be later analyzed.

Everything that is born or produced among the boundaries of the network becomes searchable and can be analyzed. Information penetrates all levels of society. Businesses, politics, government and education migrates to the network. What was previously private (for example opinions and confessions) nowadays is public knowledge and awaits to be commented and rated (Csepeli, 2015; pp.172-173). It also must be stated that internet does not forget, with some exaggeration one could say that nothing can be deleted and everything can be searched, found and analyzed. Every interaction online leaves a trail, data and can be researched (Dessewffy & Láng, 2015; p.160).

We have been gaining insights what students think about some elements of education for some time. Students are regularly surveyed in order to determine their opinion about and satisfaction with their professors and classes. But usually this results are biased, or *forced out*. Many of the students are afraid to be completely honest or don't feel the urge to express their opinion. But among the boundaries of social media where they feel at home, safe and free to talk they provide useful insights. These insights are often shattered on million Twitter channels and Facebook pages, blogs and forum, but still they provide knowledge about specific lectures, professors and institutions, and if analyzed though the lenses of Big Data a global picture about for example the usefulness of Moodle (LMS) or Coursera (MOOC) can be painted.

Opinions about learning posted in social media

In order to prove that majority of students express their opinions regarding learning in social media a research has been conducted by electronic survey in 2016 spring. It was based on simple random sampling; the target group involved full time and part time students studying three majors at Budapest University of Technology and Economics: pedagogy, economics and engineering. The research mostly focused on social media using attitudes. The survey was carried out to support our hypothesis that students nowadays argue about educational issues in social media and these opinions can be classified and analyzed. N = 119 analyzable answers arrived within the deadline. The survey consisted of 16 closed questions. The main results regarding this paper are as follows.

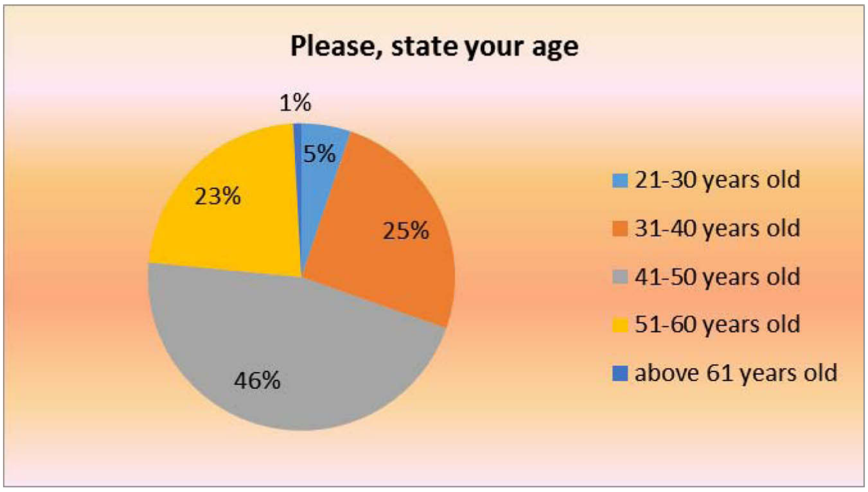

Figure 1. The diagram above shows the age of the respondents.

The majority of the students stated that community media provides a suitable field for retrieving information about courses, topic and professor and provides a democratic platform for discussing various opinions in connection with learning.

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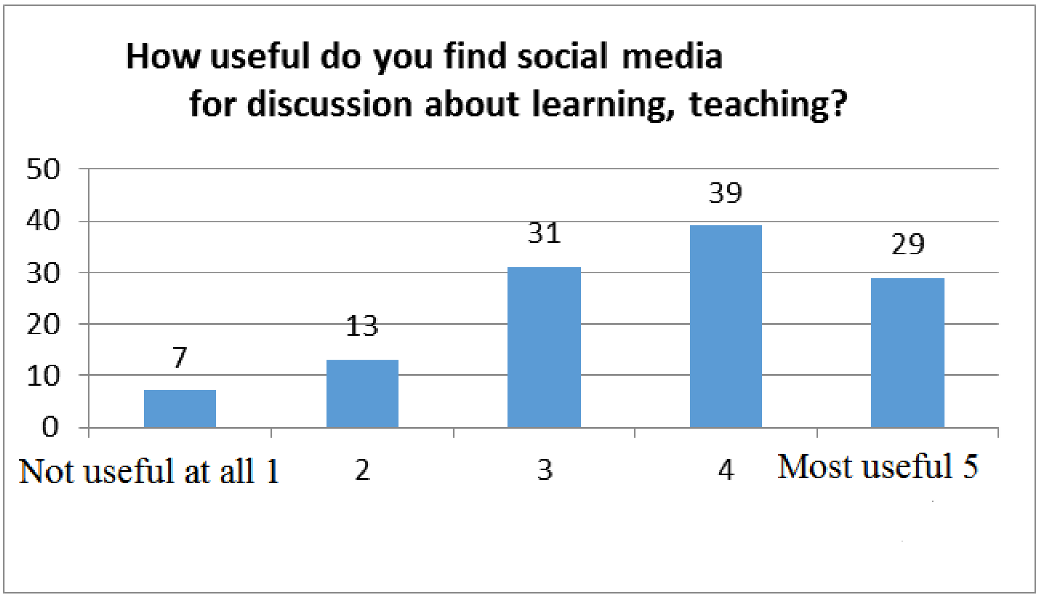

Figure 2. Social media for discussion about learning, teaching

60% of the respondents confirmed daily use of social media. In information society that is based on u-computing this activity is supported by mobile tools such as smart phones or tablets.

Big Data

Our survey was based on the answers of Hungarian students, but it is safe to say that use of social media and the attitude which considers students expressing their opinions about education freely is a worldwide phenomenon. This fact means that huge amount of date on the topic is generated continuously. Social media and the wide variety of social media channels exist where a huge amount of data available. The challenge comes in accessing that data and transforming it into something that is usable and actionable (Thiel et al., 2012). In order to analyze such a big amount of information, we should turn to Big Data.

Big Data is nowadays a popular term that describes the growth, availability and analysis of both structured and unstructured data. A huge amount of data (information) is being collected continuously from several sources, for example web-browsing and searching, social media, banking, air traffic. This data is than stored and evaluated. The amount of data is intangible in terms of personal computing. A look at the numbers reveals its potential and the amount of work needed in order to classify data and get valuable insights.

2.5 quintillion bytes of data are created every day. The growth of information becomes clear if one points out that 90% of the data in the world today has been created in the last 2 years alone. Data comes from several sources: machines and users. IoT (Internet of Things), bank transfers as well as social media interaction creates Big Data (IBM, n.d.). This paper considers the latest to be useful in order to analyze the opinions of users regarding education. Data created by users in social media can be used to determine sentiments. Big Data tools – some open source – are now available to gain a first impression of a particular social media channel.

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This way opinions posted on Twitter or Facebook, Google can be studied to provide an overview (Thiel et al., 2012).

Big Data is more than simply a matter of size; it is an opportunity to find insights in new and emerging types of data and content, to make businesses more agile, and to answer questions that were previously considered beyond our reach. Until now, there was no easy way to harvest this knowledge. But today we are witnessing an exponential growth in the volume and details of data captured by social media (Bessis & Dobre, 2014; p.4).

Usually, Big Data is characterized by three main properties, referred to as the three Vs (Laney, 2001):

- Volume (data size or amount of data);
- Velocity (the fast rate at which data are generated or they need to be processed);
- Variety (heterogeneity in content and/or form).

Data today comes in all types of formats – from traditional databases to hierarchical data stores created by end users such as camera feeds, news or social media posts – in our paper we analyze the latest.

There is a 4th V: Variability. In addition to the increasing velocities and varieties of data, data-flow can be highly inconsistent with periodic peaks. In case of social media this varies daily and event triggered peak data loads are usual (Majkic, 2014).

Social media opinions analysis using Big Data

Collecting and analyzing data stream of social media holds the promise of gaining more, faster and better insights. With the Twitter platform and blogs especially, much of this information is freely available, in case of Facebook it is more complicated as its algorithm in not really open for everyone to see. Twitter allows researchers to explore novel means of analyzing media content, as they use computational methods to assemble, filter, and interpret much of the collective Twitter conversation around a particular topic or event (Lewis et al., 2013).

Efficiency of educational methods – sentiment analysis

Opinion mining or sentiment analysis is the computational study of people's opinions, appraisals, attitudes, and emotions toward entities such as products, services, organizations, individuals, events, and their different aspects. It has been an active research area in natural language processing and Web mining in recent years. However, people have difficulty, owing to their mental and physical limitations, producing consistent results when the amount of such information to be processed is large. Automated opinion mining is thus needed, as subjective biases and mental limitations can be overcome with an objective opinion mining system (Zhang & Liu, 2014; p.1).

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The Big Data sentiment analysis presented in this paper is focused on teaching-learning issues. Using *sentiment viz* (https://www.csc.ncsu.edu/faculty/healey/tweet_viz/tweet_app/) tool we searched for general opinion about Moodle and midterms in general.

Figure 3. Sentiments about Moodle

The search for opinions about Moodle was really productive. The search returned 277 almost real time (within a time span of an hour) hits where users tweeted using the word Moodle, with the majority of tweets them being associated with positive feelings and shoving mostly active involvement. Most of the students are on alert or exited while using Moodle, they feel calm or relaxed. The most negative opinions are related to the state of boredom and intensity. Not one user expressed a feeling where he was nervous or depressed.

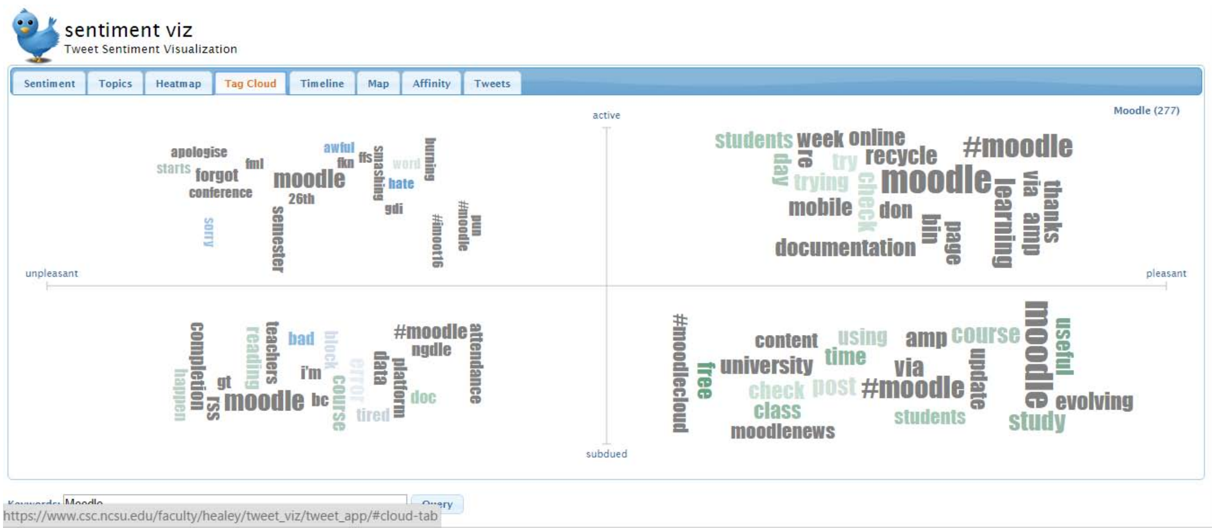

Figure 4. Tag clouds associated with the word Moodle

The tweets characterised as pleasant and active centre around tags such as learning, mobile, documentation, trying or check. The one which are pleasant but subdued use words useful, evolving, free, content, time or class. There were just a few negative tweets. The ones that carried active sentiments used word such as: awful, smashing, burning or forgot. Finally, the negative and subdued one mentioned Moodle together with the terms: teachers, course,

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attendance or reading. According to opinions, Moodle is considered to be a pleasant way of learning, where users are even exited, and no one is stressed or unhappy.

Figure 5. Sentiments about grammar

In case of sentiments about grammar in general, the results show a bit different picture than in case of Moodle. Even though the feelings expressed are mostly positive and some tweeters admitting to be elated or serene, there are some negative clusters of information, and many users feel tense or bored when expressing their opinions about grammar. Words that are associated with the state where the user feels depressed or nervous are also used.

Figure 6. Sentiments about e-learning

The feelings expressed while tweeting about e-learning are the most homogenous. Users feel alerted, calm or exited. And only 3 tweeters expressed to be tense or bored. No one stated to be nervous or depressed. Results gained through Big Data analysis show that e-learning is considered to be a very posity element of education.

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Conclusions

Examining the results we can sum up that there is an intensive chatter on Twitter about Moodle, grammar or e-learning in general. One would assume that they would not be popular topics, but with 7,000 tweets send in one second there is an amount of tweets about them that can be analyzed. Using Big Data helps gather the information and then analyze is to get valuable insights. As several applications are being develop to handle Big Data, such as Hadoop and machine learning becomes more efficient, a clearer picture can be seen from information shattered all over social media. Insights got this way are precious as they can be used both by teachers and students.

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INTEGRATION OF VIRTUAL LEARNING ENVIRONMENT INTO THE EDUCATIONAL PROCESS

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Abstract

Virtual learning environment can have an important role in the learning and teaching process. But its implementation into the educational process depends on teachers' knowledge about technology and ways how to integrate it into educational process. In this paper the results of higher education teachers' satisfaction with the VLE Merlin and its support are presented. VLE Merlin is set of learning platforms for higher education in Croatia which is maintained by the E-learning Centre at SRCE.

Introduction

Today, technology is more than a tool; it underlines and influences most of the activities in our lives: the way we learn, work, communicate with others, search for information, spend our free time etc. We are faced with a growing use of ICT in education, especially in higher education; however there are a lot of questions and issues that are still open and essential to dealing with e-learning effectiveness. One of the most important prerequisites is to provide continuing and sustainable support to teachers. Teachers often face obstacles when planning to use ICT and e-learning technologies in their teaching. They are not sure which specific technology to use, how to use it and they often lack the time to learn how to use it as they are already overloaded with their regular duties (Bates, 2000). In order to ensure successful e-learning and e-teaching, institutions should provide solid e-infrastructure and support to teachers and students. Perhaps the most basic e-learning requirement is an adequate technical infrastructure to deliver e-learning courses. The course management systems and virtual learning environments which are easy to use have encouraged the adoption of e-learning. Teachers want technology that is easy to use so that they can focus on their subject matters. And besides that, they want immediate help and answers when they face obstacles.

Virtual Learning Environment (VLE)

E-learning systems have an important place in the modern educational process. They are an integral part of teaching and e-learning programmes. Their integration into the traditional environment can strive to minimise boundaries of the educational process, making it more flexible, enabling the acquirement of new skills and competencies, but the process of creating a better educational scenario also requires adjustment, reorganisation and investment. The

WhatIs.com defines virtual learning environment as a set of teaching and learning tools designed to enhance student's learning experience by including computers and Internet in the learning process. The Wikipedia offers a similar definition of VLE, defining it as a web-based platform for the digital aspects of courses of study, usually within educational institutions. To define VLE, JISC (2008) uses the term Learning Management System (LMS) which needs to be designed to act as a focus for students' learning activities and their management and facilitation, along with the provision of content and resources required to help make learning activities successful. All of these definitions state that VLE is designed for e-learning. In most universities the VLE is a part of the 'blended learning' experience where students still have face to face lessons but increasingly which are increasingly augmented with online activities and tasks using a VLE. In their study, Pasto and Quirós (2015) state that the new generation of LMS allows interaction with other systems to understand the context in which the learning process occurs. They are also based on open and modular frameworks that allow integration with third party products, thus creating an evolving environment.

At the University of Zagreb, University Computing Centre VLE is defined as an integral environment, consisting of series of systems and tools (including Learning Management System and a variety of social software e.g. forum, chat, wiki, blog etc.), usually connected with administrative information system and digital libraries. In such an environment teachers and students communicate, cooperate and jointly follow the progress of the educational process and supplement the possibilities of the traditional learning in classroom.

VLE Merlin

One of the first goals of the E-learning Centre at the University Computing Centre University of Zagreb SRCE was to establish and provide the university with an e-learning platform and e-learning technologies. The e-learning platform, today VLE, is continuously maintained, upgraded and built on. The VLE Merlin (http://merlin.srce.hr) is available to the academic community in Croatia and consists of a learning management system based on Moodle, an e-portfolio system based on Mahara and a system for webinars based on Adobe Connect (Figure 1). The VLE is connected to the Information System of Higher Education Institutions in Croatia as well. Today, Merlin provides a sustainable and easily accessible virtual environment for over 28,000 students, 2,100 teachers and 40 higher education institutions in Croatia. There are more than 5,000 e-courses in the academic year 2015/2016 and more than 8,000 archived e-courses from the previous five academic years.

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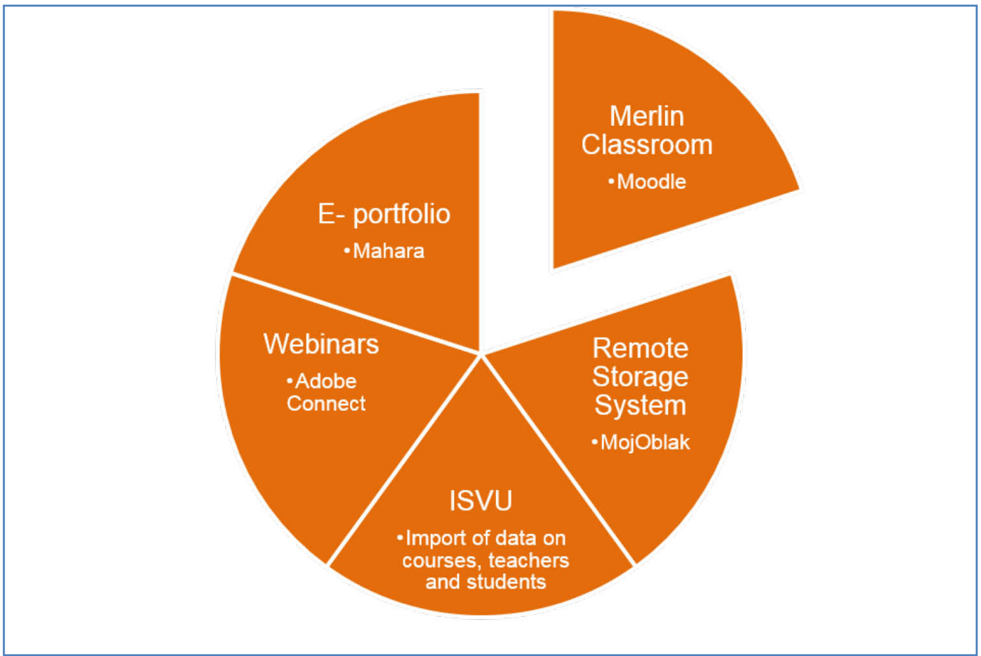

Figure 1. Virtual learning environment Merlin

Support to teachers provided by the E-learning Centre at SRCE

Organized and sustainable support to users is very important in use of new technologies. The E-learning Centre at SRCE was established in 2007 as the focal point for systematic adoption and support for e-learning at the University of Zagreb. Creating a positive attitude towards e-learning, raising awareness of e-learning within the academic community and providing necessary support to users are long term tasks of the E-learning Centre. Constant, sustainable and quality support to teachers and students is one of the priorities of the E-learning Centre. The Centre tries to provide all levels of support the users might need, from helpdesk, consultations, tutoring and training teachers to use technology and develop e-learning materials and e-courses. Special focus is placed on work with teachers on their e-courses development and improvement. Teachers often have numerous ideas but do not know how to realize them with technology in order to improve the learning process. Also, quite often, they lack the time to get familiar with technology and seek quick help in order to create an activity. For that reason the E-learning Centre offers individual consultations to teachers and carries out various e-course development projects. Besides the manuals, online and face to face training courses on how to use components of the VLE (Moodle, e-portfolio, webinars) are also available, as well as courses on the instructional design of e-courses. All user materials are regularly updated and are in accordance with the current stable version of the software. Also, for the users, the Centre made the Moodle demo system available and adapted to its Croatian users and Moodle testing system is offered as a playground for teachers, in order to practice e-course development and administration. The Centre also encourages local support teams to be set at University's departments and gladly cooperates with them. Today, the E-learning Centre does not only provide support to teachers and students at the University of Zagreb but to teachers and students at other universities and educational institutions in Croatia as well, and it is the only such centre in Croatia.

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Research and results

User feedback is very important, therefore the E-learning Centre continuously takes steps to collect and reflect on it. In this paper we will reflect on data gained from a recent survey on teachers' satisfaction with the VLE Merlin. The survey was designed as an online survey and an announcement with the link to the survey was placed on the main page of the VLE Merlin. The participation in the survey was voluntary. The survey was available from 2nd till 20th of November 2015 and participants were teachers and students who are using the VLE Merlin. Only the feedback from teachers will be analysed in this paper. The role of the teacher at the VLE Merlin is assigned to the full professors, associate professors, assistant professors and teaching assistants. As an additional support to the results of this recent study, the results of a similar study conducted in 2013 (Kučina Softić, 2014) as well as experience with everyday work with teachers will be used in order to interpret the findings and make conclusions.

Seventy nine (79.0%) teachers have participated in this survey. 54.4% of teachers were female teachers, 36.7% of teachers were older than 40, 44.3% of teachers said that they use VLE Merlin more than three years and 43% of them use VLE Merlin less than three years. Only 12.7% of teachers started to use Merlin this academic year (2015/2016).

Results of this research revealed that 64.5% of teachers have established their e-courses on their own initiative while 29.1% of them said that it was their institution's decision. The rest of the participants have indicated that the decision was made as a result of both factors (personal and institutional) or they had some other reasons.

Based on the received replies (Figure 2), teachers use the VLE primarily for storing course content and the distribution of learning materials (94.9%) so that students can access them from anywhere, anytime. In addition, materials are easy to update so teachers can provide students with the most current versions and new materials. The second most important reason is distribution of course information and course schedule (87.8%). This is particularly important to teachers as messages posted on the message board (forums) as announcements are received by students immediately via e-mail. Teachers see the benefits of ICT and e-learning in facilitating better communication with and among students, and have ranked this factor the third most important (67.1%). Online communication can be asynchronous or synchronous. E-mails or message boards can be used for asynchronous online communication while chats, instant messaging or webinars can be used for synchronous communication. A number of teachers find message boards to be quite useful in answering students' questions, continuing discussions started in the classroom or enhancing student-teacher interaction. But there are also examples where students did not see any advantage of using them and failed to participate. A smaller number of teachers use technology for assessment (46.8%), grading and giving feedback to students on their progress in the course (39.2%) and only a few (25.3%) use it for collaboration/group work. These results are identical to the ones gained in the survey that have been conducted in 2013 (Kučina Softić, 2014).

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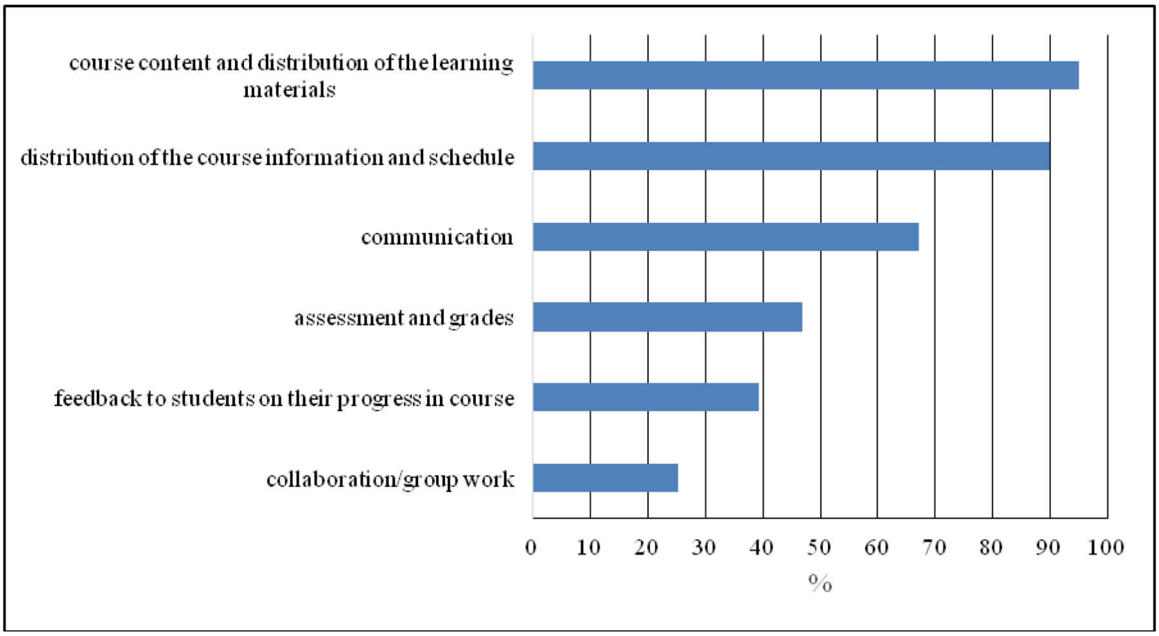

Figure 2. Bar chart showing responses to survey question:
For what part of teaching do you use ICT and e-learning technologies?, survey 2015

The survey results showed that 70.9% of teachers are satisfied with VLE Merlin functionalities, 16.5% of them are not satisfied and 12.7% cannot determine (Figure 3). The results also showed that 79.7% of teachers agree that the use of VLE Merlin contributes to the improvement of course quality, whereas 11.4% cannot evaluate the truthfulness of this statement and 8.9% do not agree with it. Furthermore, results showed that 74.7% of teachers think that the use of VLE Merlin on a wider level at their institution would significantly contribute to the quality of the educational process they deliver.

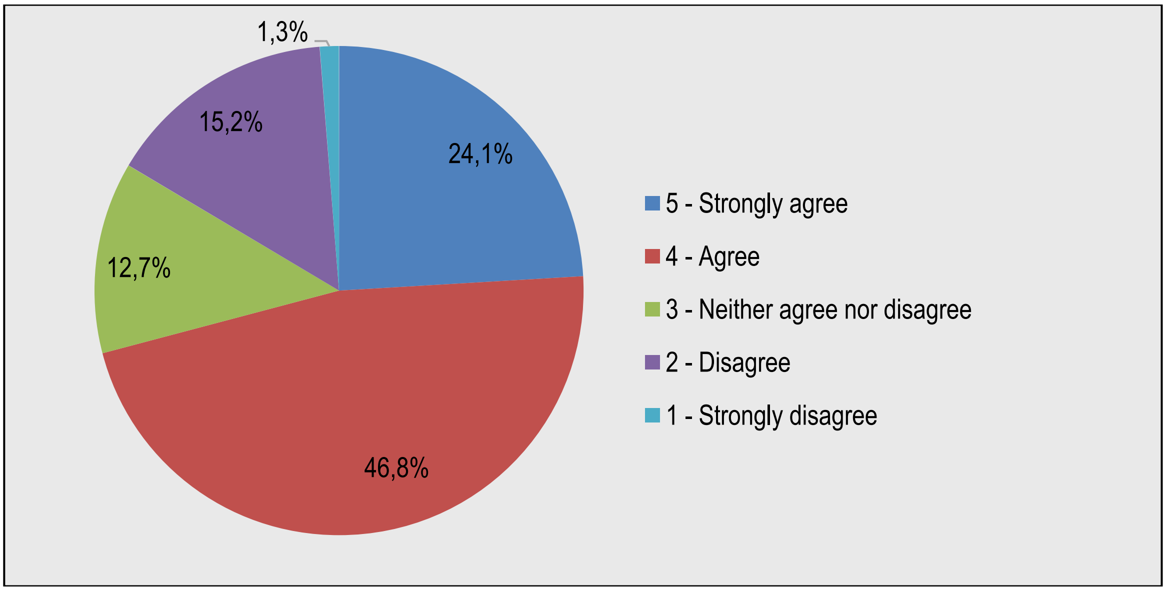

Figure 3. Pie chart showing responses to survey statement:
I am satisfied with the functionalities of VLE Merlin., survey 2015.

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Teachers stated that available and sustainable support is the most important factor that would encourage them to use e-learning. This is also supported by answers to questions concerning the importance of support in e-learning application. Teachers rated all types of support in using new technologies and their integration into the teaching and learning process to be of highest importance. Teachers stated that the most important type of support to them is support in the use of ICT.

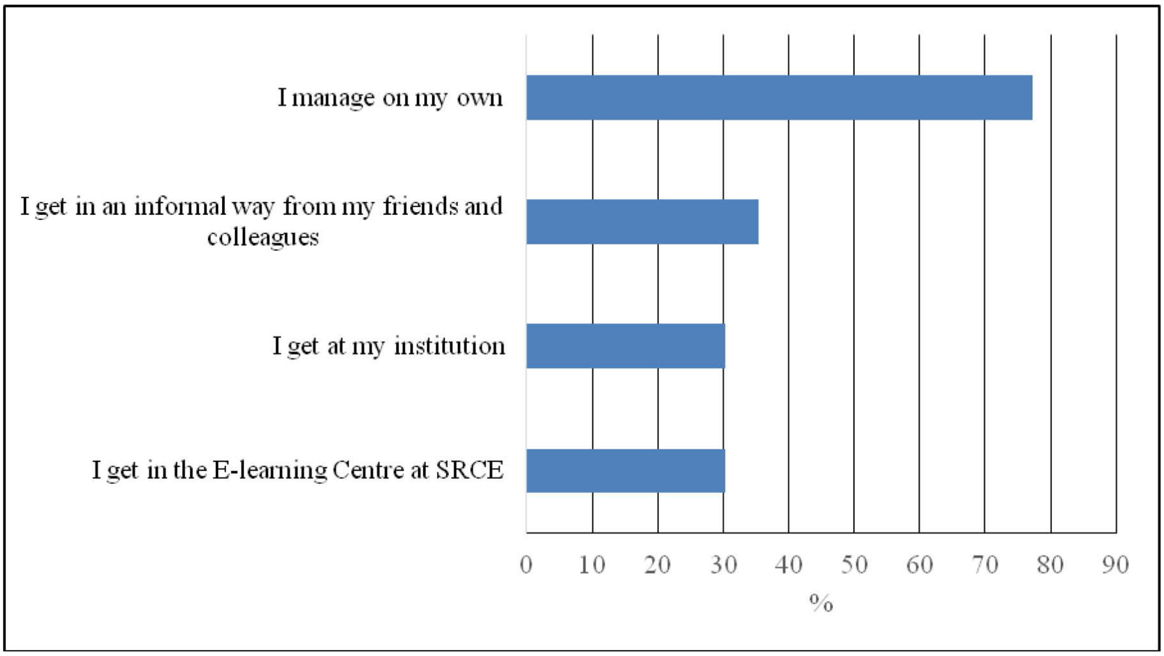

Figure 4. Bar chart showing responses to survey question:
Where do you get technical support in the production of e-learning materials?, survey 2015

Technical support for producing e-learning materials is very important to teachers but the majority of them manage on their own (77.2%) (Figure 4). This can be interpreted in two ways: that teachers are autonomous and rely on their own knowledge and efforts, or that they feel that they have no other option but to be self-reliant. A number of teachers rely on help from friends and colleagues (35.4%) and the same number of teachers (30.4%) uses support available at their institution and the E-learning Centre. The survey results from 2013 (Kučina Softić, 2014) show similar results, i.e., the majority of teachers manage on their own, whereas on the second place was the support from their institution, followed by the support from their friends and colleagues and on the last place was the support from the E-learning Centre at SRCE. The lack of adequate technical support is considered one of the most relevant factors affecting the effective introduction of technological resources in the educational environment (Pastor & Quirós, 2015). The survey results revealed that teachers who have used the available support from the E-learning Centre at SRCE consider it sufficient. However, the findings presented above indicate that more effort should be put in disseminating information about the E-learning Centre and availability of support services (helpdesk, manuals, online courses, individual consultations etc.) for teachers and students. Majority of teachers (91.1%) intend to continue to use the VLE Merlin. Smaller number of teachers (1.3%) stated that they will not continue to use the VLE Merlin. Some of the sated reasons were lack of the time and the

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support at their institution. Therefore, institution management should be more aware of the importance of providing technical support to teachers in the use of ICT and e-learning technologies in order to improve the quality of their e-learning. Lastly, the survey results showed that 91.1% of teachers intend to continue to use the VLE Merlin.

Conclusion

The European Union has been emphasising the role of the ICT and e-learning in education for over a decade. In their documents, European Commission that ICT and e-learning are key tools for modernisation and improvement of the educational process and it is important to ensure that teacher are aware of their potential and to support them in curricula, teaching guidelines and teacher training states (Staff Working Document: The use of ICT to support innovation and lifelong learning for all- A report on progress, 2008; The Rethinking Educational Strategy 2012; European Education and training cooperation: new priorities, 2015). That is why the implementation of ICT and e-learning should be a part of a strategic decision to change and improve the way universities work and produce education (Bates & Pool, 2003). One of the key factors in successful implementation of e-learning is good infrastructure and sustainable support to teachers. This support should make the use of ICT easy, allowing teachers to concentrate on educational and pedagogical goals.

The aim of the E-learning Centre at SRCE is to create a positive and useful environment for teachers to help them successfully integrate the technology into educational process. Teachers should be properly trained not only in technology but in methodologies and abilities to integrate technology into educational process as well. Lack of teachers' confidence in their technological skills leads to use of technology only to prepare course materials without fostering new ways of teaching and learning.

This research confirms that there are factors that influence teachers' attitudes towards ICT and e-learning and their implementation in the educational process. If the teachers are not aware of the technological possibilities and the way how it can be integrated into educational process, the use of technology does not innovate the learning and teaching process. The majority of teachers use e-learning as an extension of their classroom courses, to provide course content online and distribute learning materials, course information and schedule, as well as to communicate with students. They are more likely to adopt new technologies if they see that technology offers them a better way to do their work and achieve goals. When it comes to the production of e-learning materials, teachers generally rely on themselves, their colleagues and friends and sometimes they also use the technical support available at their institution or at the E-learning Centre at SRCE. Available and sustainable support and infrastructure is of great importance to teachers who are using e-learning and can be a motivator for experimenting with e-learning technologies.

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USING HYPERVIDEOS IN INITIAL VOCATIONAL EDUCATION: EFFECTIVENESS AND MOTIVATION OF INSTRUCTIONAL SCENARIOS

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Introduction

In recent years the role video can play in fostering and sustaining learning has considerably increased, and the enormous recent success registered by Massive Open Online Courses (MOOCs), in which short instructional videos support lectures, is just one confirming instance among many (see *inter alia* Giannakos, Jaccheri, & Krogstie, 2014). However, quantitative confirmation that video is one of the most-used media in schools (Corporation for Public Broadcasting, 2004) cannot be enough, and many contributions pointed out the limitations of using videos in classes (e.g. Hobbs, 2006).

In this debate, hypervideo has been considered a video-based tool able to overcome some traditional video limitations, like for example the difficulty to actively interact with the contents or the limitations for reflection or annotation to be supported (Chambel, Zahn, & Finke, 2004). In fact, several scholars pointed out that the use of the interactive features typical of a hypervideo can be a valuable instructional strategy to support learning. In particular, such a body of knowledge argues that hypervideo can be an effective tool for learning given some conditions, like for example:

- To exploit the interactive features of hypervideo, like navigation control, segmentation or functions related to the possibility of adding hyperlinked additional materials like pictures, texts, web-pages (Schwan & Riempp, 2004; Zhang, Zhou, Briggs, & Nunamaker, 2006);
- To exploit the reflective features of hypervideo, e.g. through video annotation tools (Colasante, 2011; Hulsman & Van der Vloodt, 2015) which are often integrated in hypervideo interfaces;
- To give an active role to students (Zahn, Krauskopf, Hesse, & Pea, 2010), e.g. by involving them either in a learning-by-design task on authoring the video, or in video-capturing their work experiences (Cattaneo, Nguyen, Sauli, & Aprea, 2015).

However, while most of these contributions focus on learning, few study addressed the question of how hypervideo can be integrated in instructional scenarios and there is a gap in the literature on evidence-based guidelines to properly integrate hypervideos in instructional scenarios (Stigler, Geller, & Givving, 2015; Berk, 2009).

Therefore, this is the leading question of our contribution, which constitutes an exploratory study to investigate the effects of three different hypervideo-based instructional strategies on learning, as well as the process the teacher passed through when designing the interventions. Learning is considered both under the indices of knowledge acquisition and knowledge transfer in practice, and under the indices of motivation and perceived usefulness.

Methods

Sample and procedure

Four first-year classes of clothing designer students (N = 38, female = 36; M_{age} = 17.16, SD_{age} = 3.40) from an initial vocational school in the Italian-speaking part of Switzerland (Scuola d'Arti e Mestieri della Sartoria, SAMS) have been involved and randomly assigned to four different conditions: (a) Plenary lesson (n = 6), where the teacher used the hypervideo in front of the class as a support for her teaching; (b) Individual use (n = 11), where students individually used the hypervideo in front of a screen in a computer lab; (c) In-group use (n = 12), where students, in groups of three each, have been asked to build the interactivities of the video, adding learning materials to the raw video; (d) Traditional lesson (control group, n = 9), where students attended a traditional lesson, without using the hypervideo. The three experimental conditions are illustrated in Figure 1.

The teacher, the content of the lesson (seam anomalies) and the learning materials have been the same in all the four conditions. The raw video was produced by the teacher, who then took care of transforming it into a hypervideo, both including the audio and integrating additional materials and interactivities. In the plenary condition, the audio was silenced, substituted by the teacher's voice; students directly participated in the discussion. In the individual condition, the teacher gave the assignment and let the students work alone with the hypervideo, anyway being at their disposal for any question. In the in-group condition, the raw video was given to the groups without any additional material, but in order to structure and facilitate the task, the same elements included in the teacher-generated hypervideo were given to students as possible materials to use. The traditional lesson was led as it was always the case in the school when treating this topic. Although we did not want to have a media comparison study, we included this fourth condition under the request of the teacher and her colleagues, eager to know the difference in the outcomes with respect to the "traditional" scenario. In order to get students familiar with the interface, a preliminary lesson on a different topic (how to thread a needle) was managed by the teacher using the hypervideo tool in all the four classes.

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Figure 20. Illustration of the three experimental conditions: plenary (left), individual (centre), in-group (right)

All the four scenarios had the same structure, mainly based on three different parts: (a) an Introduction, where the teacher exposed the topic and the objectives to be reached at the end of the lesson, and activated prior knowledge connected to the new topic (10 minutes), (b) a Central phase (50 min. for plenary, individually and control; 85 min. for in-group), where the hypervideo was used as described above; and (c) a Closure phase (30 min.), where the teacher involved the students to summarize the main contents of the lesson. The full procedure is shown in Figure 2.

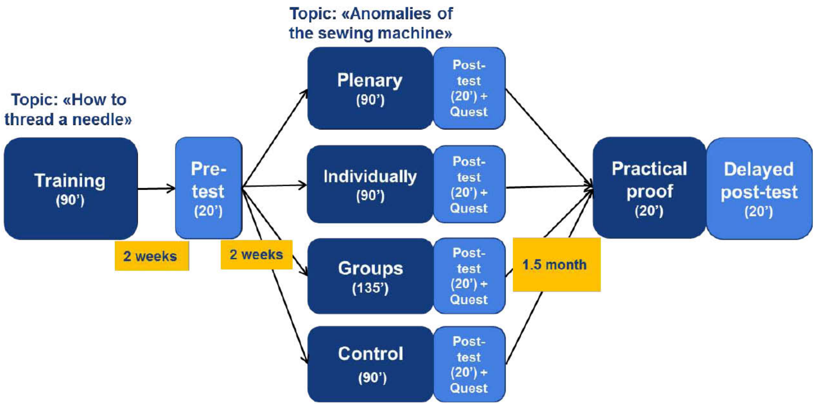

Figure 2. Scheme of the complete procedure

Measures

Declarative knowledge acquisition was measured through a pre-/post-/delayed-post- test design. The test contained questions related to anomalies of the sewing machine, most of them conceived as open questions about how to manage practical professional situations. The remaining questions asked to match the right description to a picture. The highest possible score amounted to 50 points. The pre-test was submitted one week before the lessons; the post-test immediately after the lesson; the delayed-post-test 1.5 month after the lesson.

Just before filling-in the delayed-post-test, students were asked to perform a practical proof too, in order to have a measure of their skills in managing sewing anomalies. Each student had 20 minutes to pass through four different sewing machines, and for each of them to identify which was the current anomaly, explain its causes and how to solve it. A thinking aloud protocol recorded their answers.

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Satisfaction and perceived usefulness were assessed in the three experimental conditions through a questionnaire based on the Usefulness, Satisfaction and Ease of Use scale (USE; Lund, 2001; 11 items). Motivation was measured in all the four conditions through a questionnaire too. We considered two main dimensions: Task relevance and Flow. For the former we used a subscale of the Specific Final Motivation Questionnaire (SFMQ; Van der Meij, 2013; 5 items), for the latter, 10 items from the Flow Short Scale (FKW; Vollmeyer & Rheinberg, 2006). All the items were based on a 6-points Likert scale from -3 = *totally disagree*, to +3 = *totally agree*.

Results

As a preliminary analysis we checked for the groups to be comparable, using three different measures: grades from the middle school, grades from the first semester, and the pre-test score. An ANOVA was performed and results show that the students in the different conditions did not differ as regards to middle school grades, $F(3,28) = 1.60$, *n.s.*, first semester grades, $F(3,31) = .35$, *n.s.*, and prior knowledge, $F(3,34) = 2.24$, *n.s.* We could then proceed with the following analysis.

Declarative knowledge acquisition was measured through a repeated-measure general linear model. Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 27.5$, $p < .001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (= 0.64). The main effect was significant ($F(1.28, 43.43) = 57.56$, $p < .0001$). Post-hoc comparisons showed significant differences between the individual condition and both the in-group and the traditional conditions, in favour of the first (Descriptive statistics and figures respectively in Table 1. and Figure 3.).

Table 4: Descriptive statistics of the pre-post-delayed-post tests

Condition	n	Pre-test M(SD)	Post-test M(SD)	Delayed post-test M(SD)
Plenary	6	4.25(2.86)	30.58(8.55)	30.25(11.84)
Individually	11	7.45(2.69)	31.05(4.91)	37.26(9.66)
In-group	12	5.98(4.09)	24.52(9.62)	32.19(11.54)
Control group	9	4.47(1.08)	21.47(4.55)	26.21(9.35)
Total	38	5.78(3.15)	26.64(8.04)	32.36(10.82)

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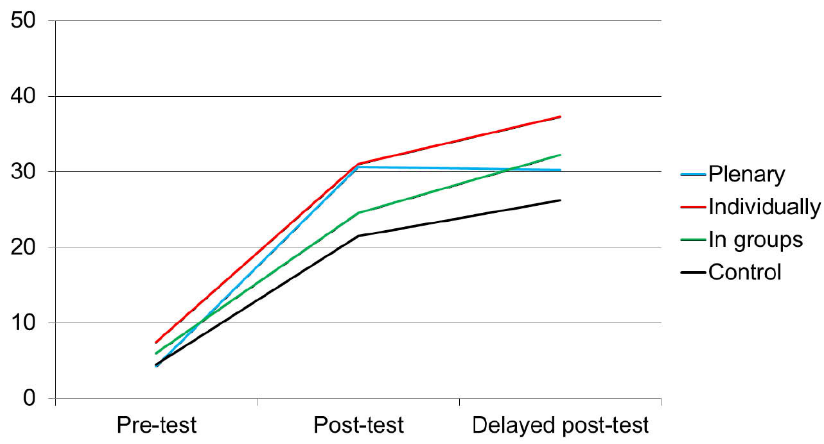

Figure 3. Results of the GLM repeated measures in graphical form

A one-way ANOVA on the practical proof score showed a significant difference at the 0.9 significance level ($F(3,26) = 2.43$, $p = .09$). Post-hoc analysis showed that all the three experimental conditions outperformed the control group.

Satisfaction and perceived usefulness were generally high in all the three groups (Satisfaction: $M = 2.08$, $SD = .73$; Usefulness: $M = 2.24$, $SD = .78$), with higher scores for satisfaction in the in-groups condition and with higher perceived usefulness in the plenary condition. A one-way ANOVA showed significant differences for perceived usefulness only ($F(2,26) = 4.13$, $p < .05$), with the plenary condition emerging with respect to the individual one.

Task relevance and flow also showed a high degree of motivation with no significant differences among the groups and with the plenary condition showing the highest scores in both dimensions.

The analysis concerning the teacher's role and of her reflections about the implementation are still in progress and will be presented at the congress.

Discussion

The study presented here constitutes a first exploratory investigation about the effectiveness and perceived usefulness of using hypervideo in different instructional scenarios within initial vocational education. Although preliminary, this study shows that hypervideo represents an effective way to learn and an incentive for student's motivation. Knowing the critics about media-comparison studies, results show anyway that the use of hypervideo is effective both in terms of declarative knowledge acquisition and students' satisfaction – experimental conditions always outperforming the control group. We can also be moderately positive with respect to its effectiveness for sustaining the transfer of such a knowledge into professional practice. Generally speaking, the most promising condition seems to be the one where students interact individually with the hypervideo, which is not surprising considering the literature on using videos for instructions and the related emphasis on the importance to control pacing of information (e.g. Delen, Liew, & Wilson, 2014; Merkt, Weigand, Heier, & Schwan, 2011; Zhang et al., 2006). As well, positive results concern the plenary condition,

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where sharing and interaction among students can be profitable to learning. This result is interesting when considering that we have few studies in the literature on this way of using hypervideo in a real class, and it suggests then the possibility to further investigate under which conditions the use of hypervideo in a plenary strategy is worthy of attention. The in-group condition resulted to be more satisfying for students, but at the same time it required a bigger effort both in terms of time and cognitive load and in terms of organization. The question would be to investigate more to what extent such an investment is worthy depending on different kinds of content.

Concerning teachers' practice, the study also gives indications about how their role changes across the different instructional implementations and about their competence development too. For example, the teacher could realize what it means to prepare the learning resources for the four implementations, and which are the requirements for having good materials. As a paradigmatic example we cite the design of the hypervideo in its video, audio, and additional materials components. The currently missing analysis will give us useful guidelines for teachers and trainers willing to use hypervideos in their practice.

All in all, these findings inform us about the opportunity to integrate – and to further investigate the use of – hypervideo in an instructional scenario, especially in those contexts like vocational education where theory and practice have to be related one to the other. The implementation of the three hypervideo-based instructional scenarios gave us some hints about the different possibilities we have to use hypervideo in classes and the different effects it can bring to the learners. Of course, the study is only preliminary in this respect, and its limitations have to be faced, starting from increasing the sample size and balancing the different conditions, which was not possible acting in an ecological framework with authentic classes. Other instructional possibilities also emerged from this experience in order to increase students' creativity and to connect formal and informal learning, for example asking students to directly provide the raw video exploiting their professional experiences during stages or in-company training. Finally, this option bring us toward a new possible learning environment, which is conceived beyond the boundaries of the school and – with respect to dual vocational education in particular – without artificially distinguishing between the world of school and the world of workplace practice.

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HOW SOCIAL NETWORKING EXPERIENCE RELATES TO SOCIAL PRESENCE AND ATTITUDE OF USING SNS IN EDUCATION

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Abstract

The purpose of this research is to explore the effects of students' social networking experience on social presence and attitude of using Social networking sites (SNSs) for educational purposes. As online learning has increased a number of researchers have focused on the need to integrate techniques to strengthen students' social presence in online learning. SNSs have been suggested as an effective tool to increase social presence. To investigate the effects of students' social networking experience on social presence and their perceptions of using SNSs for educational purpose, 82 students were surveyed. Results show that students use SNSs frequently and actively for various reasons in their daily life and they showed a positive perceptions of using SNSs for educational purposes. Results also revealed the intensity of using social networking experience does have a positive influence on students' perceptions of using SNSs for educational purposes.

Background and theoretical framework

Previous studies have demonstrated the impact of SNSs on social relations and outcomes. The benefits of SNSs, including the establishment of community and strengthening social connectedness, are associated with social presence as it is shaped and continuously changed through interaction and social connection with other people (Raacke & Bonds-Raacke, 2008; Scearce, Kasper & Grant, 2010). While technologies may have an innate impact on social presence, it has also been shown that individual learners can cultivate it (Gunawardena & Zittle, 1997; Richardson & Swan, 2003; Swan, Garrison, & Richardson, 2009). Our understanding of social presence has shifted from viewing it as a quality of medium to a perception of the participants in online communication (Gunawardena & Zittle, 1997; Swan et al., 2009). We can define social presence as "the degree to which a person is perceived as 'real' in mediated communication" (Guawardena & Zittle, 1997; p.8), or more broadly, "one's perceptions of oneself and others" (Yamada & Goda, 2012; p.31).

It has been well documented that social presence has a considerable effect on interaction and learning outcomes in online learning (Hostetter & Busch, 2013; Picciano, 2002; Richardson & Swan, 2003; Swan & Shih, 2005). For example, Richardson and Swan (2003) reported that social presence of students has positive influences on both perceived learning and perceived satisfaction with instructor in online learning. Swan and Shih (2005) found that students who perceived high social presence showed higher satisfaction with online discussion, interaction, and perceived learning than students who perceived low social presence. Hostetter and Busch (2013) also reported positive relationships between social presence in discussion boards and students' learning outcomes. Specifically, students that demonstrated higher social presence in discussions scored higher on written class assignments.

Several researchers have studied the relationship between SNSs and perceived social presence of learners to identify the benefits of SNSs as an educational tool. Dunlap and Lowenthal (2009) used Twitter as a supportive tool to enhance students' interaction and social presence. They reported that students' social presence and interaction were enhanced through the immediate and emotional conversation on Twitter. Choi and Kwon (2012) also demonstrated that Twitter can contribute to improve students' social-affective and cognitive presence. In addition, some educational institutions are looking to develop their own SNSs for learning (Tally, 2010).

Research has grown in the past few years to investigate how students' learning can benefit from SNSs. For example, Greenhow (2011) reported that SNSs have social learning functions including developing more creative ideas through the sharing of feedback with other users and receiving help and advice about class related tasks or school life in general. Mazer, Murphy and Simonds (2007) also suggested that instructors' use of Facebook can effect students' motivation and attitude about the teachers and their course positively through self-disclosures on Facebook. They found that after visiting the Facebook page of a teacher who provided photographs and personal information students showed higher levels of motivation and positive attitude about the teacher, course, and perceived classroom climate than participants in a low teacher self-disclosure condition. Additionally, SNSs can be an effective platform for personal and social learning by allowing students to collaborate and communicate with other students more easily than in traditional learning management systems (Dabbagh & Kitsantas, 2012). The results of previous research show a positive expectation that social networking activities and social networking sites can promote social communication and collaboration which would benefit learners.

Objectives/purpose

Despite the positive expectation that social networking activities and social networking sites can promote social communication and collaboration, little is known about students' prior experience with using SNSs and how their social networking experiences impact (a) their social presence and, (b) their perception of using SNSs for learning. To fill this gap, the following research questions were examined in this research:

1. How are students in online courses using SNSs?
2. Does students' intensity of use of SNSs influence their social presence in online learning?
3. What are students' perceptions about using SNSs for educational purposes?

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4. Does the intensity of use of SNSs effect students' perceptions about using SNSs in educational environments?

Methodology

Data source

The data were collected from an online Masters' Program in Learning Design and Technology at a large public university. Eighty-two students participated in this study. Of the participants, 79% were female (n=65) and 21% were male (n=17). Participants ranged from 24 to 58 years of age. Most participants were experienced in online learning with 70 students having taken at least 5 online courses and 10 students having completed 2-4 online courses.

Data was collected through the survey which consisted of two parts: The Social Networking Use Survey and the Social Presence survey. The Social Networking Use Survey consisted of four sub-categories: (a) demographic items, (b) general information about the use of SNSs, (c) intensity of using SNSs, and (d) perceptions of using SNSs for educational purposes. Next, the social presence survey consists of 9 items and is one subsection of the Community of Inquiry (CoI) instrument (Cronbach's alpha = .91) (Arbaugh et al., 2008; Swan et al., 2008).

Data analysis

For RQ1 and RQ3, descriptive statistics (frequency, percent, mean, and standard deviation) were used to examine demographic information and students' use of SNSs and to identify students' perceptions of using SNSs for educational purposes.

For RQ2, before analyzing the correlation between the intensity of using SNSs and social presence, we examined how age and gender were related to students' social presence score to identify the potential possibilities that demographic factors influence students' perception of social presence. Next, we examined the intensity of use items in relation to students' social presence score and sub scores for the 3 social presence categories: affective expression, open communication, and group cohesion. For each analysis, Spearman's rho was used to calculate correlational values. For RQ4, we examined the relationship between the intensity of use of SNS items and students' perceptions of using SNSs in an educational environment by using Spearman's rho for analysis.

Results

RQ 1: How are students in online courses using SNSs?

According to the analysis result, 65.9% of students reported that they have used SNSs for at least 6 years. Only 3.7 % of participants had less than one year of experience. Facebook was selected as the most widely used SNS (95.1%). This was followed by LinkedIn (85.4%) and Twitter (46.3%). The most frequent purpose for using SNSs was keeping in touch with friends (90.2%). Career networking was also a common purpose (76.8%). We also identified students in this research use SNSs intensively in their daily life (see Table 1).

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Table 1 Intensity of Students' Use of SNSs

Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	M (SD)
SNSs are part of my everyday activities	6/7.3%	5/6.1%	6/7.3%	30/36.6%	35/42.7%	4.01 (1.19)
I feel out of touch if I haven't logged onto my SNSs for a while	11/13.4%	15/18.3%	15/18.3%	27/32.9%	14/17.1%	3.22 (1.30)
I feel I am part of my SNS community	7/8.5%	9/11.0%	18/22.0%	31/37.8%	17/20.7%	3.51 (1.19)
I would be sorry if my SNSs were shut down	10/12.2%	12/14.6%	13/15.9%	30/36.6%	17/20.7%	3.39 (1.30)

RQ 2: Does the intensity of use of SNSs influence students' social presence in online learning?

Before addressing RQ2, we ran age and then gender in relation to students' social presence scores using Spearman's rho correlation. The result for gender was not statistically significant (R_s = -.061, p>.01) indicating that there is no difference for the mean score of social presence between males (m=4.24, N=17) and females (m=4.18, N=65). The correlational analysis for age and students' social presence scores was also found not to be significant (R_s= .062, p>.01).

Spearman's rho was then calculated to determine the association between items for students' intensity of use of SNSs and students' (a) social presence scores, (b) sub scores for social presence group cohesion items, (c) sub scores for open communication items, and (d) sub scores for affective expression scores. The sub scores for Social Presence were investigated to see if SNSs impacted specific social presence characteristics such as open communication in online courses. None of the intensity of use of SNS items was found to have a significant correlation to the scores.

RQ 3: What are students' perceptions about using SNSs for educational purposes?

Students agreed (using a 5 point scale) that SNSs can promote motivation for learning (m=3.74), increase connectedness to a learning community (m=3.74), and be effective as a means to communicate (m=3.90) and collaborate with peers (m=3.56), and using SNSs for educational purposes would be convenient (m=3.79). Of note is the finding for the item "I would feel more comfortable using SNS as a discussion tool in place of traditional course discussion boards (m=2.91)" indicating that while students felt positively about using SNSs for educational purposes, they would not necessarily feel comfortable going so far as to disrupt or replace more traditional online course techniques to do so.

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RQ 4: Does the intensity of use of SNSs influence students' perceptions about using SNSs in an educational environment?

To address RQ 4, the relationship between three of the intensity of use of SNS items and students' perceptions of using SNSs in an educational environment was examined using Spearman's rho. Intensity items included "How many days per week do you use SNSs", "SNSs are part of my everyday activities", and "I feel I am part of a SNS community". The result showed that more intensive users of SNSs are more likely to have positive perceptions of using SNSs for educational purposes. Table 2 shows more detailed information about the result.

Table 2 Correlations for Students' Intensity of use of SNSs and using SNSs for educational purposes.

Question	How many days per week do you use SNSs	SNSs are part of my everyday activity	I feel I am part of a SNS community
Using SNSs for educational purposes would be convenient	.308**	.362**	.477**
SNSs could be used to support face to face learning	.292**	.379**	.468**
Using SNSs for class could promote motivation for learning	.294**	.247*	.423**
Using SNSs for class could make me feel more connected to my learning community	.318**	.253*	.396**
I would feel more comfortable using SNS as a discussion tool in place of traditional course discussion boards	-.119	-.277*	-.122
SNSs could be used effectively to share class materials	.270*	.319**	.304**
Using SNSs as an educational platform could promote better rapport with peers	.264*	.339**	.407**
SNSs could be an effective way to collaborate with peers	.380**	.293**	.410**
SNSs could be an effective way to communicate with peers	.382**	.373**	.412**
I feel that my privacy would be invaded if SNSs and my courses overlapped	-.224*	-.158	-.161
I don't care one way or the other about SNSs being used for educational purposes	.036	-.051	-.175

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

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Discussion and conclusions

We determined that most students in our particular sample are familiar with SNS environments and view SNSs as an integral part of their daily life. The results of this research are consistent with previous research reporting that SNSs have been integrated into students' daily lives (Pempek, Yermolayeva & Calvert, 2009).

Dohn (2009) stated that students' skilfulness and familiarity with using web 2.0 tools including SNSs can promote those technologies to be effectively integrated into various educational environments. The findings of this research showing that most students are accustomed to SNSs may imply that students can extend their use of SNSs to the educational setting without much difficulty or needing to learn the basics of SNS functionalities.

Next, the students indicated social relationships as their dominant purpose for using SNSs, but this research also demonstrated that students do consider SNSs as a place where they can also gather and share information more generally. Considering that sharing information is an important activity in learning, this implies that SNSs are likely to be an effective tool or environment for educational purpose as well as for social friendships. However, as we also found, students are not ready for SNSs to replace more traditional aspects of online courses such as discussion boards.

This study also identified positives correlation between the intensity of using SNSs and students' perceptions of using SNSs for educational purposes. This result is consistent with research by Alhazmi and Rahman (2013) which reported that students who have more experience with using SNSs have a more positive attitude using SNSs for academic purposes. This result shows that more experiences and familiarity with using SNSs are likely to be an important factor in students' positive perceptions of using SNSs for educational purposes. When we consider that most current undergraduate students are familiar with SNSs, the findings propose a positive expectation that current and future students may be open and ready to use SNSs for educational purposes on a technical level.

In addition, overall, the students revealed a positive attitude toward using SNSs for educational purposes, indicating it could increase motivation for learning, increase learning community intensity, and communication and collaboration with peers. This result coincides with the previous research which indicated that students revealed positive perceptions of using Facebook page as a supportive tool for learning (Irwin, Ball, Desbrow & Leveritt, 2012; McCarthy, 2012; Tower, Latimer & Hewitt, 2014). Similarly, Hamid, Waycott, Kurnia and Chang (2015) identified that students in higher education recognized benefits of SNSs for an educational purpose including promoting interaction with peer and instructor as well as improving their critical thinking and self-monitoring for learning. Understanding students' perceptions and attitudes about the academic use of SNSs is necessary prior to integrating SNSs into the educational context (Sánchez, Cortijo & Javed, 2014). The findings of students' positive perceptions are a meaningful first step to integrating SNSs for educational purposes.

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Interestingly, no significant relationship was found between the intensity of using SNSs and students' perceived social presence. This contradicts what limited information is available relating SNSs and social presence, including the idea that the use of SNSs may have effects on students' social presence by enhancing the abilities of open communication or experiences of web community. The lack of significance may be attributed to the fact that survey items for social presence have focused only on students' perceptions about their social presence (Lowenthal & Dunlap, 2014). Lowenthal and Dunlap (2014) pointed out the possibilities of differences between what students actually *do* and what they *perceive*. They posited that the CoI social presence survey items need to be revised by combining what students actually *do* and what instructors and peers *do* and *say* about their presence with their self-perception.

Additionally, we believe there might be other reasons to explain the non-significant relationship between the intensity of using SNSs and students' perceived social presence scores. The identified non-significant correlations between the intensity of using SNSs and social presence score and sub scores for our participants contradicts previous research that says SNSs have psychological benefits that promote students' social and cognitive skills and meet the need for intimacy and social support in online environments (Tynes, 2007). Instead there may be the need for a different skill set in an academic of formal setting such as an online course. Kirschner (2015) would agree as he explains, "the users themselves, though often very experienced in using SNSs, are not fluent or accomplished in using them as tools to build on existing knowledge and create new knowledge" (p.624). In other words, while students may have the technical skills from previous SNS experience they may be lacking in the academic skills and how they would relate to SNSs. If the main purpose of SNSs is to maintain already existing relationships or develop purely social relationships, a SNS in an educational context would ask that students connect with others that they may not normally connect to and to conduct activities that may include not only building community but critiquing and relying on the work of others. As Kirschner (2015) clarifies, SNSs can narrow the social connections of students thereby limiting their affective connection and social bond within a specific group.

Together with previous research and our own results, it is safe to say that adopting SNSs for educational purposes is a real possibility as a means to overcome issues such as isolation or lack of community, given continued advances in SNSs capabilities. Yet the question remains if this also holds true for online learning environments as we originally set out to discover. The participants were from an online graduate program but further research is needed to determine if our learners' positive views of SNS for educational purposes is more of a general perception than specifically related to online learning.

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ONLINE COURSES EVOLVING TEACHER EDUCATION PROGRAMS

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Introduction

Online Teaching in teacher training colleges has become part of training towards schools of the future. Colleges are opening more and more massive online courses. Skills to integrate technology into learning are becoming increasingly important both for the college students' studies and for their ability to fit into the schools of the future. The Ministry of Education considers the student's ability to fit into schools today, not to mention the schools of the future, as one of its main goals, and the goal is that colleges will train graduates who will be able to lead changes and implement technology in schools. Therefore, it is important to assess the contribution of the online courses for the technology literacy of teacher trainees. The proposed research will analyse the contribution of the various methods of online courses (Hybrid, Online, MOOC) for a length span of several years, at a width span of various student populations, undergraduate and graduate students. This study examines the attitudes and perceptions of students in various courses in several areas: the teaching process, the contribution of online tools, self-study, satisfaction, contribution to the learning course, implementing different learning tasks, and the use of technology for teaching and learning. The questions which have arisen focus on the pros and cons of each model, the contribution of each model to students' perceptions on the integration of ICT in teaching and its influence on students' achievements. The study used questionnaires based on the MOFET research network, students' achievements, courses' outcomes and interviews with students from all courses. The findings will be used to discuss the controversy regarding implementation of online courses in colleges of education as part of the curriculum.

Literature review

ICT in teaching

The groups responsible for leading education in Israel and abroad called upon the implementation of information and communication technologies (Kwong, 2015; Voogt et al., 2015; Melamed et al., 2010). As a promoting step, national programs began to appear in Israel and abroad (OECD, 2011), as well as in the teacher training system. However, studies conducted on these programs indicated little progress and excessive work that falls on the Ministry of Education in training teachers and teacher educators (Goldstein et al., 2012).

Programs to integrate ICT in teacher training have become part of the plan to adjust the education system to the 21st century. Within this framework, technology professors must combine studying the discipline, methodology and pedagogical training (Melamed et al., 2010). A study done before the program began, pointed to deficiencies in training students to integrate ICT in teaching. About three-quarters of the graduates of teacher training colleges completed their studies without practical experience in this area, and in recent years the scope of ICT courses which are taught at colleges have been reduced. It seems that the policy of the institutions affected the reduction of teacher training courses in the field of ICT, as well as a lack of motivation by many teachers and pedagogical counsellors to adopt pedagogical innovation and demonstrate it to the students. These reasons have led it to a halt of the process of implementation of ICT in recent years. It seems that many professors at colleges of education are incorporating ICT in their lessons in traditional ways, but only a fraction of them combine them in advanced methods such as Inquiry learning, individual and group creativity, authentic problem solving and collaborative learning (Goldstein & et al., 2012; Schrire, Shonfeld & Zelkovitz, 2015). These skills also appear in other documents on teacher training around the world. One of the recommendations is learning and fostering creativity through exploration activities and problem solving, while working in collaboration with colleagues and using information technologies. In addition, the intelligent use in synchronous and asynchronous surroundings, bringing students to self-esteem and peer esteem, collaboration and assessing information skills, will lead teachers to a rapidly changing world (Resta & Carroll, 2010; UNESCO, 2009). In addition, teachers must be trained in distance online teaching, following an increasing demand for such instruction in the education system (NACOL, 2007).

Teacher training colleges, in charge of student training, should develop pedagogical approaches, appropriate skills for the 21st century and required technological literacy. Modelling of lecturers as well as learning experiences will influence the perception of teacher trainees' teaching (Cochran-Smith, 2003). In other words, online teaching experiences will lead teachers to think about the pedagogy which is based on technological environments. This concept is important because children spend much of their time in this environment, but on the other hand school is becoming less relevant. Of course one cannot expect that the use of massive online environment alone will increase school relevance, but this is an important and major factor in making school meaningful for the students (Rotem & Peled, 2010).

Hybrid courses, online courses and MOOC

Comparison of hybrid courses and online courses which were conducted at the College of Education showed students in online courses emphasized the pedagogical component of the course and that of peer learning and its contribution. In the hybrid course, they emphasized the contribution of technology tools. Online courses may change the way of teaching and may enable each student to be a partner in learning, which is not possible within the framework of the traditional classroom (Kritz, Rozner, Shonfeld & Gujski, 2014). These findings support expanding the use of online courses.

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The information revolution has brought about a significant change in lifestyle for many around the world, and the ongoing growing access to the Internet has brought about, among other things, to increase in the use of distance learning in various educational settings. Advantages of distance learning are that it is not limited to time and space, and allows flexibility and personal learning. However, its integration into the education systems has encountered difficulties (Even & Slavi, 2010).

Following distance teaching models such as correspondence and radio and television broadcasting, online education is often seen as a-synchronous, executed in learning management systems such as Moodle. These are used to manage course content, teaching and learning activities, interaction between students and between students and the instructor asynchronously only (Moore & Kearsley, 2012). Recently, the development of communication technologies and accessibility to the use of the Internet at speeds and bandwidths are increasing have sparked new directions of thought concerning the use of online technologies, including combining approaches (blended/hybrid) where teachers combine media types (text, audio, video) also synchronously (Skype, Blackboard, Hangout) in the same course. (Roseth, Akcaoglu & Zellner, 2013).

Under ideal conditions, combining approaches makes it possible to combine technology, pedagogy and content to the specific needs of different learners and different requirements derived from different teaching and learning context (Mishra & Koehler, 2006). But in practice, when designing an online course, tough decisions need to be made about the structure of online teaching, which will allow a certain course in a certain context, for example, the lecturer's desire to use cooperative learning pedagogy or any other pedagogy.

MOOC

In recent years, there is a trend of increasing the number of students in each class in colleges of education in Israel. This corresponds to the global phenomenon of the opening of the courses with numerous participants called MOOC (Massive open online courses). Most famous among them are university courses around the world as part of Udacity, EdX, Coursera, and other projects continue to evolve. Universities are joining this trend due to the perceived prestige of these courses and also because of the economic aspect which enables cost decrease of courses. This change causes many academic institutions to re-examine the methods of teaching and the contribution of each model. The MOOC courses which are designated towards thousands of students are generally based on the cognitive-behaviouristic approach (Daniel, 2012). The courses are based on the teacher's class recordings, additional videos, reading materials and interactive questions which lead to a discussion among participants.

In a study of the scope, extent and characteristics of the use of video of MOOC participants, it was found that most participants in the course viewed at least one video in his self-learning. However, many participants did not watch video at all. Most of the viewing was done before the exam. In addition, it was found that watching the video was made through online means

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(Daniel, 2012). This raises the question as to the improvement in learners' achievements in online courses which include multimedia materials.

Many studies conducted in the last twenty years have shown no significant difference in learning achievement between the online course and the classroom course. However, researchers believe it is important to distinguish between different learning success of various teaching methods and in reference to the way teaching and learning occurs in online teaching. It seems that further studies are needed to refine our understanding regarding the most effective teaching environments for different students (Moore & Kearsley, 2012). Therefore, studies of various online courses could contribute to understanding the ways online courses should be built and implemented.

Study context and subjects

The study was conducted in courses taught for undergraduate and master's degree (nine different courses). The college curriculum includes basic studies and enrichment courses (including courses in computer applications participating in the study), education studies and literacy research in education, experience in teaching, pedagogy and methodology and studies that focus on the teaching profession. Examining the perception of the students about the contribution of the course learning, student achievement, and the visible benefits of each model, will enable re-examining the desired models. In addition, change in a specific course over the years and among different populations will enable a thorough examination of these models.

The study population included about 350 students studying in Undergraduate courses, computer applications in education (110) – Master's degree in technology in education (50 + 40). Undergraduate students who study in an online course (25 + 25), undergraduate students enrolled in the hybrid course (25). Graduate students M. Teach (30+ 40). A comparison will be conducted between students enrolled in 2016, 2015 and the results of the study conducted on the students enrolled in 2013, 2014.

Research questions and hypothesis

In recent years, teaching colleges are required to implement online courses in order to adapt to the digital reality of the 21st century. At Kibbutzim College overtures were also conducted to examine the effectiveness of online courses in different styles: hybrid courses, online courses and as well as MOOC multiplayer courses. These courses receive much investment and financing from the developers. Therefore, it will be interesting to compare the different models of courses provided by the college in different populations and in recent years (2013-1016).

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Research question

What is the contribution of the multiplayer online course to education students' studies versus the blended course and hybrid course?

Sub-questions:

1. What is the contribution of each model to the training of students to integrate ICT in teaching, as students and as teachers of the future?
2. What is the contribution of each model to the student's perception about the integration of ICT in teaching?
3. What is the contribution of each model to the achievements of the student?

Study type

The research was done in a mixed methodology, i.e. in quantitative methods which include questionnaires with closed-ended questions and achievement tests. However, in order to completely understand the differences between the students from various learning models, five students from each course interviewed and there was a content analysis of. The questionnaires were based on a related, validated questionnaire from MOFET research network ICT. In addition, the contribution of each model to the student's skills development was examined and the advantages and disadvantages of each were discussed.

Models of teaching subjects in research

Three models of teaching subjects are examined in this study: multiplayer online course, a *standard* online course and the hybrid course. One multiplayer online course meeting was held in order to learn technological environments and how the course is conducted. Later, self-learning takes place which is based on weekly assignments which include Q/A forums (a discussion group in which participants get to see the discussion only after submitting their post), videos and interactive questions, including peer assessment.

A *standard* online teaching model includes one face to face meeting (the first lesson) and the rest of the course is in a learning management system, with asynchronous components along with synchronous components simulating the F2F in a virtual environment.

The hybrid teaching model, the course is partly online and consists of five F2F sessions which is conducted frontally. All materials studied, and even expanded, are in LMS (Moodle), accompanying the course and except what is taught and expanded, have the rest of the mechanisms that accompany the course: discussion groups, tasks and mechanisms for their submission, tracking attendance and grades, announcements, etc.

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Preliminary results

The college feedback questionnaire showed that the students appreciated both courses and the scores were high. Analysing the course products and activities showed no differences in activities pattern in individual assignments, while in the collaborative assignments, especially those requiring discussion, there were differences. In class discussion only few students participated but in the online course most of the students participated.

Students from the Hybrid course emphasized the ICT tools they learned to use while students from the online course emphasized self-learning, peer teaching and various pedagogical strategies.

The content analysis is in process and more results will be added to the proceeding file. However it seems that students understand the importance of such courses. As one of them wrote: "It enabled me to take responsibility on learning, to get involved in learning and to put efforts in learning".

Discussion

The infiltration of MOOC's into higher education institutions also affects teacher training institutions. Teaching various levels of online teaching is gradually replacing the traditional frontal teaching. The learning environment in educational institutions and the students' private sphere are becoming more and more ICT. App usage is growing in most aspects of everyday life, as well as in learning and teaching. Various difficulties, geographic and others, raise the need for online teaching. The considerations are not always relevant in the field of pedagogy, and administrative considerations such as better utilization of classrooms *tempt* the management of educational institutions to teach online, which doesn't need classrooms. There are supposedly relevant considerations as well: the continuous improvement of browsing speed and LMS technologies enhances the possibilities for online teaching. Often the argument arises about the need to expose students teachers (and their teachers) to technologies and teaching models that become part of our world and which they will likely encounter in their field of work and hence the importance of exposing student teachers to virtual teaching environments (Campbell, 2009).

Much has been researched and written about the pros and cons of online teaching. Its wide availability and improvement are rapidly and increasing and are confronted by the fear of its disadvantages, such as the loss of the social component and the experience of F2F human encounter, or its lack of suitability for certain learning styles and students.

Results of this study will be added to this paper along with the discussion. However, this study could be used as a pilot for further studies dealing with the development of online teaching in higher education institutions in Israel and worldwide.

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EXTENDING LEARNING ENVIRONMENTS IN HIGHER EDUCATION: ONLINE PEER-TO-PEER COUNSELLING IN PROFESSIONAL DEGREE PROGRAMS OF SOCIAL WORK

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Introduction

There has been a lot of discussion about the role of digital media in higher education. Principal advantages of incorporating educational technologies into higher education teaching are generally conceived to manifest themselves at three different levels (HEFCE, 2009): (a) *efficiency* can increase as regards cost-effectivity, time-effectivity, sustainability or scalability, (b) *enhancement* of both the learning and teaching experience can occur by multimedia, more international and authentic learning resources, (c) *transformation* may be achieved with substantial qualitative change in learning and teaching processes or radically new processes.

This paper will deal with a transformative change in *learning environments* in higher education by digital media: The method and the accompanying platform that will be investigated are not substitutes of traditional learning environments but actually merge different learning environments into one – the classic higher education learning environment and the more professionally oriented learning environment with actual real life professional challenges. Key to such merging learning environments is the method of *online peer-to-peer counselling* and a special web-based platform *kokom.net* (https://www.kokom.net) to support such innovative and collaborative learning experiences. The method *online peer-to-peer counselling* and the accompanying platform *kokom.net* is used within a Bachelor degree program in Social Work that targets professionals in the social work sector who lack an academic degree and are looking for an opportunity to study alongside their jobs. The purpose of using online peer-to-peer counselling is twofold: Firstly, in our digitized society online counselling constitutes an important field of social work practice and students need an opportunity to experience an online counselling setting themselves to actually grasp the potentials as well as the drawbacks of such a setting. Secondly, and perhaps even more importantly, by practicing online peer-to-peer counselling with the support of the specialized platform *kokom.net*, students acquire a method that is well established in social work practice and they get to know a platform beyond the confines of higher education as *kokom.net* is a well-established platform in the social work sector.

This paper describes and analyses the use of the *online peer-to-peer counselling* method and platform within the study program as part of a comprehensive case study. With this case study I aim to unpack the special effects that such an extension of learning environments has in detail. I will focus here on three different areas: (a) the perspective of learners, (b) the perspective of teachers, and (c) knowledge transfer from the university to the social work sector. Methodologically, the case study will draw on evaluation data form surveys, document analysis of student generated reflective e-portfolios and notes from teacher discussions by means of participatory observation.

Online Peer-to-Peer Counselling as Part of Online Counselling

Online Counselling – a Social Work Practice of Growing Importance

Digital media are nowadays deeply embedded in the professional and private lives of a great part of the population in Germany. Thus digital media are also part of the lived-in world of many users of social support services and therefore it does not come as a surprise that many established providers of counselling added online facilities for counselling to their regular face-to-face services (Hintenberger & Kühne, 2009). In this paper I use the term *counselling* as opposed to *psychotherapy* as the provision of consultation or advice for challenging (professional) life situations. With this distinction, the paper adopts the German (and Dutch) usage of the term as opposed to for example the British usage that regards counselling and psychotherapy as synonyms (cf. Weitz, 2015; pp.105-106).

Advantages of online counselling services are generally seen in (a) their flexibility regarding time and location, (b) a low threshold of accessing them as well as (c) the possibility to obtain counselling anonymously (Barak & Grohol, 2011; Brunner, 2009; Thiery, 2011). Occasionally, the primarily written character of online counselling is regarded as an extra intrinsic value (Vogt, 2007). Dodier and Knatz (2003) argue that the process of writing as such is beneficial for the soul. However, this is a highly disputed issue. Research on computer-mediated communication (CMC) in general produced a more differentiated view on advantages and disadvantages of the dominant written character in CMC (Döring, 2003; Walter, 1992; Walther & Burgoon, 1992). According to CMC research the written character of CMC is a special one. It can be regarded as a new genre of literality that incorporates features of oral communication and is thus often referred to as *oral literality*.

Early research on CMC emphasized the reduction of communication channels in CMC. The lack of nonverbal clues such as facial expression or intonation and social clues as to age or physical appearance of the communication partner seemed to make CMC inferior in comparison to face-to-face communication. On the other hand, it was observed that a unique written notation developed to make up for this potential deficit such as emoticons and acronyms and that CMC, at least in longer lasting communication set-ups, could compensate for the deficits mentioned (Walther, 1992). In addition, channel reduction can foster concentration on content and the lack of social clues can make the communication more egalitarian as well as help to overcome social inhibitions. Empirical research regarding these effects of CMC produced contradictory results. It became evident that the actual context of CMC seems to be as important as the mediated communication situation as such.

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The reduction of social inhibitions, on the other hand, could be an asset in counselling situations as clients might open up more easily to a conversation regarding potentially shameful issues. Another result of research on CMC for online counselling showed that the tendency of projection and imagination in counselling situations is reinforced in online settings (Brunner, 2009) and should thus be reflected upon carefully. On the other hand, the written character can make the counselling process more sustainable as all people involved can read and reflect the automatically documented process. At the same time, being able to stay anonymous in a counselling situation can be an important advantage for people looking for advice. Also, clients using CMC in many aspects of their professional or private lives often just do not want to change their way of communicating when in need of a consultation (Hintenberger & Kühne, 2009). Evaluation studies on online counselling generally showed good results of effectivity and confirmed that the settings reached clients that would not have otherwise used a counselling service (Kordy et al., 2006).

Barak and Grohol (2011) developed a typology for internet-based interventions in the field of mental health that can be transferred to online counselling settings as well. They differentiate the following types:

1. Informative websites;
2. Interactive self-help tutorials;
3. Web-based professional online counselling;
4. Online self-help groups and peer-to-peer counselling;
5. Other informal forms of obtaining help and advice.

In the case investigated in this paper online peer-to-peer counselling (type four) is the key method employed to extend learning environments in higher education, therefore it is described in more detail in the section below.

Online Peer-to-Peer Counselling

Peer-to-peer counselling, also known as *peer group supervision* (Tietze, 2008) is an established counselling method that works without an external counsellor, leader, supervisor or expert (Linderkamp, 2011). Groups of 5-7 colleagues or peers get together to discuss and resolve professional personal issues and challenges, in a clearly structured, neatly scripted procedure, in addition to or as a substitute for clinical supervision. The method is also used outside the social work area, for example among teachers (Jordaan et al., 2016) or top management executives (Gloger, 2013).

Different models exit for the structuring of the counselling process itself. The *Lüneburg model* comprises nine actual steps, the tenth is about archiving the process itself (Jordaan et al., 2016). The *Heilsbronn model* uses the following ten steps for the actual counselling process:

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Table 1: Ten-step Heilsbronn Model of Peer-to-Peer counselling (Spangler, 2012)

Step No.	Who?	What
1	all	Assign group roles (case presenter, facilitator, consultant)
2	case presenter	Presents case
3	consultants	Ask questions for better understanding the case
4	consultants	Brainstorming associations, sensations and fantasies
5	case presenter	Feedback to the collection brainstormed
6	consultants	Collect ideas for solutions
7	case presenter	Feedback to ideas for solutions
8	all	Discussion of solutions and possible implementation
9	consultants, facilitator	Bring in own experience in similar cases
10	all	Debriefing: reflect what was helpful, what could be improved

This procedure, initially developed for face-to-face meetings, has been transferred to the virtual realm and an online platform kokom.net (https://www.kokom.net/) has been developed that guides people through the ten steps of the counselling process (Spangler, 2012). For the Lüneburg model a platform is still under development that is targeted at teachers only (Jordaan et al., 2016).Thus it will not be considered in this article any further. It uses a room metaphor for the virtual counselling spaces and it provides *a virtual conference and counselling house* where different organizations can use different *floors* that provide private counselling spaces with corporate identity of the organization. The most important feature of the platform is that it provides absolute privacy and secure communication, abides by German data law protection and thus reaches a completely different level of data protection than other social media communication services in the internet.*Kokom.net* works with a freemium model as far as costs are concerned. The basic usage is free for anybody interested in it for non-commercial purposes. Premium services such as the corporate identity for separate *floors* in this virtual collaboration *house* are available for a monthly or annual fee. The platform is used by professionals in the social field where funds for external supervision are often not available or cannot be organized quickly enough. The online platform, however, can be used instantly and flexibly as communication here is asynchronous and supports geographically dispersed teams.

Online Peer-to-Peer Counselling in a BA Social Work Degree Program

Context

The study program *basa-online* is a degree program offered by Munich University of Applied Sciences, Germany. Professionals in the social work realm who have relevant work experience in the social work sector (at least 3 years) but lack a formal degree may enrol in the program, study alongside their jobs, in a combination of online modules at the learning management system OLAT (75% of the study time) and face-to-face instruction (25% of the study time) and obtain a bachelor degree in social work. As an overall design feature, the work experience of the students is used as a starting point to explore social work theories. Generally, the

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program design aims at interweaving professional experience and academic knowledge closely.

Extending Learning Environments in Module "Scientific Theory-Practice Transfer"

The online module *Scientific Theory-Practice Transfer* takes four semesters and is especially designed to give students ample opportunity to reflect on their professional experience under the light of newly acquired theoretical knowledge and to accompany students' personal learning trajectory. The module starts with a face-to-face seminar that gives students an overview of the module's aims, general structure, activities and technologies used. The rest of the module is delivered entirely online. Assessment takes place via an e-portfolio that students build up over the four semesters, with the e-portfolio software Mahara. The method of peer-to-peer counselling is integrated into the module to end the classic "compartmentalization" of knowledge that often appears in students' mindsets: knowledge is considered to either pertain to the higher education (learning) environment or to the workplace (learning) environment. Peer-to-peer counselling using the platform kokom.net seems to have the potential of transgressing traditional organizational borders: Within the higher education framework real life cases from the working environment are discussed, supported by a platform that is used in both sectors. Thus the module is structured with peer counselling processes at its core and the platform *kokom.net* playing a key part in the module's extended learning environment. Table 2 shows the module's educational design:

Table 2: Educational Design of Module Scientific Theory and Practice Transfer

Sem. No.	Task	Technology
1	Peer-counselling on real life cases	OLAT & kokom.net
2	Creating guidelines on key theoretical concepts	OLAT
3	Peer-counselling on professional identity	OLAT & kokom.net
4	Creating e-portfolio on learning trajectory	OLAT, kokom.net & Mahara

The two peer-counselling processes consist of (a) discussing a challenging case from students' professional practice, and (b) a role conflict at the work place, stemming from students' own higher education learning trajectory. Students should benefit from this design on three different levels: (a) results of the counselling process, (b) coming to know a tool that is used in the professional community and will be available to them beyond the time of the study program, (c) already mixing with the professional community at the time of the study program as students are free to choose group composition beyond the student community.

Evaluation and Critical Assessment

Student Perspective

Evaluation data showed that students regarded the method of online peer-to-peer counselling mostly as helpful for their work situation, often the peer-to-peer counselling (PTPC) process led to entirely innovative ideas and generally the experience was perceived as more beneficial than was initially expected:

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Table 3: Level of Agreement (1 = *not at all*, 2 = *rather not*, 3 = *do not know*, 4 = *rather yes*, 5 = *very much*), cohorts 1-3

Statement	1	2	3	4	5	Mean
PTPC was helpful for my work situation						
Cohort 1 n = 15			1	06	8	4.47
Cohort 1 n = 23		2	1	11	9	4.17
Cohort 1 n =27	2	3	2	14	6	3.7
PTPC provided entirely innovative solutions						
Cohort 1 n = 15				07	8	4.53
Cohort 1 n = 23		3	1	15	4	3.87
Cohort 1 n = 27	2	5	5	13	2	3.30
PTPC was more beneficial than expected						
Cohort 1 n = 15			2	03	10	4.53
Cohort 1 n = 23		1	2	12	08	4.17
Cohort 1 n = 27	1	-	6	09	11	4.07

In open commentaries, many described that their initial attitude ranged from being sceptical to being very doubtful that such a method could be applied online successfully and that case presenters would actually assess the process as useful to solve their real life cases. This was mainly due to the students' assessment of the channel reduction in CMC. Before they had actually experienced the method and the platform, they seemed to not be able to believe that such a *thin communication* could be effective for authentic, serious challenges and problems. However, the case presenters unanimously agreed that the suggestions for solutions elaborated during the peer-to-peer counselling process *did contribute* to their own efforts to solve the problem. In addition, the consultants and the facilitators in the various counselling processes also experienced the overall process as *target-oriented* and *successful*. Students in all roles highlighted the importance of the strict *built-in scripting process* by which the platform *kokom.net* guides participants through the ten steps of the Heilsbronn model of peer-to-peer consulting. Several students stated that they felt their professional experience was valued within the counselling process and yet at the same time they were gaining new insights, thus acknowledgement of their professional experience seemed to be combined with further learning.

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In general, students appreciated the privacy features of kokom.net. In particular the fact that every user can individually decide how much of their identity is shown to others was regarded as important to very important (Scale of importance with 1 = *entirely unimportant*, 2 = *unimportant*, 3 = *do not know*, 4 = *important*, 5 = *very important*: Means: Cohort 1 – 4.67, Cohort 2 – 4.52, Cohort 3 – 4.15). Even higher importance was given on average to the feature that only room members can read the contributions and nobody else (Same scale; Means: Cohort 1 – 4.87, Cohort 2 – 4.61, Cohort 3 – 4.74).

Usability issues arose out of the notification system of *kokom.net*: Many students regarded the e-mail notifications about updates as obtrusive and preferred a system with finer granularity of choice in notification.

Teacher Perspective

Content analysis of teacher communication during the module revealed that the main issue for the teachers was the *shift of control*: The peer counselling processes of the student peer teams take place in private, protected *counselling rooms*. As a consequence, with flourishing counselling processes on the way as well as with processes that do not take off, instructors have no means to judge the situation. The early e-learning motto *from the sage on the stage to the guide at the side* is implemented here at its best. For instructors, initially, this can be a strange experience and feels at times like a *loss* of control rather than a *shift* of control.

In order to get students' feedback whether peer-to-peer counselling processes are taking place and to be available in case questions arise or guidance should be needed, the *plenary conference room* on *kokom.net* gains importance: For improved transparency for all participants, students as well as lecturers, it proved useful to establish a meta discourse in the *plenary conference room*, with some simple rules stated upfront.

Knowledge Transfer from University into the Social Work Sector

An unintentional result was a knowledge transfer from university to the social work sector. In each of the five student cohorts that have finished the full cycle of the module, there were 2-5 students who found the peer-to-peer counselling process so useful that they immediately started to introduce it to their workplace organisations that had not used the method and platform before, most not having even heard about it.

Regarding the three cohorts surveyed, within Cohort 1 (n = 15) that already graduated, 5 students already used kokom.net again within 3 months after they left university, 6 did not have the opportunity but stated they intend to do so in the near future. In the other cohorts (Cohort 2, n = 23, Cohort 3, n = 27) 17 respectively 20 were considering using the method and platform after their studies or even definitively plan to do so. Even if these numbers regarding intentional future use have to be interpreted carefully, using the peer-to-peer method on *kokom.net* during the study program seemed to generate a positive knowledge transfer from university into the social work sector which is regarded as an overall gain, even if not intended initially at the start of implementing this educational design.

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Conclusions

In this paper a case was presented in which the classic higher education learning environment merged with the workplace environment by using the method of peer-to-peer counselling and a specialized online platform that supports these new collaborative learning experiences across organizational borders. The method and platform, embedded in a comprehensive educational design, seem to be of great benefit to students and, by means of knowledge transfer from university to the social work sector, also to social organizations. In particular, the highly structured procedure for the peer counselling process was regarded as useful. Usability issues were reported with the e-mail notification system. Further refinement of the educational design should look at the question of how to grant a shift of control to students but still provide transparency for all participants about what is going on.

In sum, the extension of learning environments across organisational borders, from higher education to the social work sector, seems to be a good step to stop the *compartmentalization* of knowledge often encountered in academic programs that aim to prepare for the labour market.

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HOW DO FACULTY MEMBERS REACT TOWARDS THE USE OF PERSONAL MOBILE DEVICES BY STUDENTS IN THE CLASSROOM?

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Introduction

In recent years a growing number of students use mobile technologies in classes, e.g. laptops, tablets of all sorts or smartphones; these are uses as substitutes to the traditional means of taking notes in class (Kurtz & Meishar-Tal, 2015). Usage of mobile technological means in class enables several advantages to students, such as immediate knowledge organization, access to online information that supports in-class learning, or student communication. These may empower and support the learning process altogether (Sharples, 2000).

This new situation is beneficial for the institute itself: the fact that students arrive with personal mobile devices to class saves a vast amount of resources as an alternative to expenses for the construction of computer labs and their maintenance. In fact, this new situation turns all spaces within the organization into potentially capable of becoming ICT-saturated zones (Emery, 2012; Hamza & Noordin, 2013; Nykvist, 2012).

For faculty, this may serve as an advantage, since students' accessibility to online information via mobile technologies enables lecturers' usage of these devices in their lessons, thereby creating interest and a variety of learning modes, as well as allowing constructivist pedagogy and active learning Campbell & Pargas, 2003; Meisha-Tal, 2014).

The literature presents several examples for effective usage of mobile devices for in-class learning, e.g. active learning through interactive surveys (Kohen-Vacs et al., 2012), or using the built-in camera in some mobile devices as well as the microphone and recording devices for documenting learning processes (Benedict & Pence, 2012; Zadok & Meishar-Tal, 2014). Research shows that the implementation of mobile technologies within learning processes by faculty has positive influence on motivation for learning (Rau, Gao & Wu, 2008), as well as on the level of active learning in the lessons (Barak et al. 2006; Melton & Kendall, 2012).

Aside of the advantages of using mobile technologies in class, some disadvantages can be identified as well. The main drawback is the distraction issue: mobile technologies distract the students by creating diversions from the main course of the lesson and creating temptations for students (Barkhuus, 2005; Gehlen Baum & Weinberger, 2012). In a study that examined uses of mobile technologies in lessons, findings suggest that these not only do not contribute to the learning process, but may also harm or hinder it (Fried, 2008). The reason for this finding is the possible difficulty in carrying out multiple cognitive tasks simultaneously (multi-tasking) (Kraushaar & Novak, 2010).

Hence, it is not surprising that many faculty members in higher education hold negative attitudes towards students using mobile devices in their lessons. They see students' uses of these devices as a nuisance, since they pose a competition for their students' attention. Students using mobile devices in the lesson are considered by their lecturers as rude and a distraction to themselves and to others (Baker et al. 2012). Several faculty members perceive usage of mobile technologies as contributing to superficial learning and damaging the teacher-student dynamics that is created within the lesson (Handal et al., 2013).

The goal of this study is to examine how teacher educators cope with students bringing mobile devices into lessons, in a situation that lacks an overt policy regarding this phenomenon (e.g. is bringing these devices allowed or forbidden, is using them in lessons allowed etc.). We were interested in whether teacher educators initiate incorporation of mobile devices in their lessons, if they forbid usage of these devices, or if they are indifferent regarding the phenomenon and do not interfere in their students' behaviour regarding the utilization of mobile technologies in their lessons.

Research questions

1. How do teacher educators perceive the usage of mobile devices by students in class?
2. How and to what extent do teacher educators react to the usage of mobile devices by students in class?
3. What is the connection between teacher educators' perception regarding students' usage of mobile devices and their reaction de facto to these uses?
4. What is the connection between teacher educators' perception regarding students' usage of mobile devices and their acquaintance with possible uses of these devices?

Method

The study was conducted using a quantitative method. A questionnaire was distributed among faulty members of two academic colleges of education. The questionnaire contained five parts: the first part included demographic information (e.g. gender, age); the second part focused on the usage frequency of mobile devices in classes (including laptops, smartphones and tablets); the third part focused on perceptions regarding uses of mobile technology in classes; the fourth part focused on the reactions of teacher educators towards uses of mobile technology in classes, and finally, respondents were requested to grade their acquaintance with implementing mobile technologies and applications to enhance their students' learning.

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Respondents included 152 teacher educators from two academic colleges of education, 86 from one college and 66 from the other college; of these, 121 were female and 31 men. Age range was 33-70 (=50.4), average years of teaching =21.36, average years of teaching in the college =9.3. Respondents reported an average of ICT competencies of =4 on a 1-5 Likert scale. The questionnaire was analyzed statistically, and teacher educators' attitudes and reactions towards students' uses of mobile technologies in lessons were examined.

Results

Findings show that the most common device among students, according to faculty assessment, is the smartphone. Laptops and tablets were evaluated as less widespread among students, but still available to some students (Table 1).

Table 1: Students' inventory of mobile devices, according to faculty perceptions (N=141)

Type of device	Estimation of mobile devices available for students by faculty	SD
Smartphones	4.48	.81
Laptops	1.88	.78
Tablets/iPads	1.44	.72

Q1: How do teacher educators perceive the usage of mobile devices by students in classes?

The research tool included a question with 18 items referring to faculty attitudes towards usage of mobile technologies, divided into 4 categories: advantages for students, disadvantages for students, advantages for faculty, disadvantages for faculty. The average of each category was computed, representing each category (Table 2).

Findings show that the average ranking of perceived advantages is significantly higher than that of the perceived disadvantages of using mobile technologies, regarding usage of mobile devices, with regards to faculty, with $t(151)= 9.801$ with $p<0.001$, as well as students , with $t(151)= 12.798$ with $p<0.001$. As for perceived disadvantages in using mobile technologies in classes, disadvantages for students were perceived as higher than disadvantages for faculty.

Table 2: Faculty perceptions regarding the advantages and disadvantages of using mobile technologies in classes (N=152)

Categories of perception	Average	SD
Advantages for students	3.50	.92
Advantages for teacher educators	3.49	.90
Disadvantages for students	2.89	.97
Disadvantages for teacher educators	2.30	.94

The complexity of faculty perceptions regarding student usage of mobile devices in classes was also evident in open-ended questions in which respondents were requested to explain their attitudes towards usage of mobile devices. One of the teacher educators wrote: "It's complicated. On one hand, I think that you should allow uses for learning purposes. On the other hand, students do not follow the rules, and enter social networking sites instead, and

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this interferes with the learning." Another lecturer wrote: "As you may have noticed, my responses supposedly contradict. I think that laptops can be used in classes and that they promote learning. On the other hand, they also pose a major diversion. A lot depends on the students' level of maturity, if the lesson is great; otherwise they will not be involved at all."

Q2: How and to what extent do teacher educators respond to usage of mobile devices in classes?

The research tools included a question containing 8 items describing possible reactions of faculty towards students' uses of mobile technologies in classes. These were divided into 3 categories: Proactive response, Preventive response, Indifference.

According to the highest average computed for each respondent, they were assigned to one of the three groups/categories. Findings show that most teacher educators (64%) do not exhibit an active response, but rather respond indifferently, about one third (30%) reported active and initiative responses that reflect encouragement of students in using mobile devices and even initiating activities; the remaining 15% claimed that they prevent usage of mobile devices in classes.

Q3: What is the connection between faculty perceptions regarding usage of mobile devices by students in class and their responses to these uses?

Findings reveal a significant correlation between a preventive mode of reaction and perceptions of perceived disadvantages of mobile technologies usage in class, as well as a significant negative correlation between avoidance and perceptions of the advantages of using mobile technologies in classes, that is, the more the perceptions of disadvantages is higher, the more reactions of prevention are displayed, and the more the perceptions of advantages is higher, the less reactions of prevention are displayed (Table 3).

Table 3: Correlations between faculty perceptions regarding students' usage of mobile technologies in classes and their reaction towards usage de-facto (N=152)

	Preventive	Indifference	Proactive
Perceived disadvantages for teacher educators	.486**	-.301**	-.390**
Perceived disadvantages for students	.483**	-.284**	-.481**
Perceived advantages for teacher educators	-.379**	.287**	.612**
Perceived advantages for students	-.424**	.313**	.652**

Notwithstanding, as for proactive indifference and reactions, they are in direct relationship with perceptions of the advantages in using mobile devices in class, but in reverse relationship with the perceptions of disadvantages in using mobile devices in class. The strength of the correlation is especially strong between proactive reactions of teacher educators and perception of the possible advantages for students and teacher educators in using mobile technologies: r=.652 and r=.612 respectively.

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Q4: What is the connection between faculty acquaintance with mobile technology usage in class and attitudes towards using mobile devices by students and their reaction to this usage?

We examined whether the degree of faculty knowledge of mobile technology usage in class is connected with their perceptions regarding usage of mobile devices by students. For this purpose, teacher educators were presented with several possibilities of usage, and were requested to grade their familiarity with each of them on a 1-5 Likert scale. Table 4 presents teacher educators' knowledge of possible uses of mobile devices.

Table 4: Level of teacher educators' knowledge of possible uses of mobile devices for learning (N=152)

	Average	SD
Information source	4.03	1.17
Computerized learning environments	3.23	1.35
Digital learning products/outcomes	3.05	1.46
Collaborative tools	2.95	1.44
Educational forums	2.91	1.48
Online surveys	2.49	1.42
Social networking sites	2.39	1.38
Documentation of learning processes	2.16	1.41
Location=based information	2.07	1.31
Writing and documenting apps	1.76	1.17
Augmented reality	1.63	1.12
Measurement and inquiry apps	1.62	1.09

The data highlights that the degree of faculty knowledge regarding possible uses of mobile technologies in class differs according to its utilization. Basic uses, e.g. searching for information and computerized learning environments are familiar to teacher educators to a greater extent, however, more advanced possibilities, e.g. collaborative tools, online surveys and documentation tools for the learning process (for example, Evernote) are less familiar.

Based on faculty grading of the possible uses of mobile technology in education, we computed a new measure: familiarity with uses of mobile technologies (α=.915), which is the average grading of all uses per lecturer. In addition, Pearson's correlations were computed for between this measure and perceptions regarding uses of mobile technologies. Findings are presented in Table 5.

Table 5: Correlation between level of acquaintance with mobile technology uses for learning and perception of advantages and disadvantages of its incorporation in class (N=152)

	Perception of advantages for teacher educators	Perception of disadvantages for teacher educators	Perception of advantages for students	Perception of disadvantages for students
level of acquaintance with mobile tech. uses	.418**	-.318**	.382**	-.346**

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Data shows that positive attitudes towards mobile technologies (including advantages for faculty as well as students) are significantly correlated with the level of acquaintance with mobile technology uses. Respectively, negative attitudes towards mobile technologies are significantly but negatively correlated with the level of acquaintance with mobile technology uses.

In addition, we examined the correlations between the level of acquaintance with mobile technology uses and faculty reactions to students' uses of these devices. Findings show that there are significant correlations between acquaintance with mobile technology uses and two reactions: the preventive and proactive modes (-.231** and .514** respectively); that is, a positive significant correlation between knowledge regarding uses of mobile technology in classes and the proactive response mode, and a negative significant correlation with the preventive reaction mode. As for the indifference reaction – no correlation was found. Therefore, we can state that the more teacher educators know what to do with mobile technologies in their classes, the more they display a proactive mode of response, and the less they display a preventive mode.

Discussion

The goal of the current study is to examine the perceptions and reactions of faculty to students' use of mobile technologies in classes. Findings show that in spite of the growing scope of mobile devices (mostly smartphones, but also laptops and tablets) the initiated usage by faculty is not as widespread respectively. Most teacher educators do not respond to the perceived change in the noticeable change in availability of mobile devices for students. They do not change the course of the lesson and do not adapt it to the new possibilities posed by these new technologies. However, most of them do not prevent the students from using these means in a spontaneous and informal mode. The possible reason for this may faculty's mixed attitudes towards mobile technologies: on one hand, they acknowledge the advantages in using these devices in the lessons, but on the other hand they are also aware of the disadvantages in using it.

Another reason that faculty do not respond to the change in their classes is the fact that most teacher educators lack the knowledge regarding the utilization of mobile technologies in effectively in class. They report that their knowledge of the different possible uses of mobile devices in class is mediocre at best in most categories. The only use familiar to most teacher educators is search of information on the Internet. This may explain why in spite of the fact that faculty acknowledge the advantages of using mobile technologies in class, the do not initiate these uses.

This explanation is supported by the finding that indicates a correlation between the rates of faculty exposure and the perceived benefits in using mobile technologies and the variety of its possible uses. Findings show that the more exposure rates of faculty are higher and the more they are knowledgeable regarding usage of mobile technologies in learning, the more they

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initiate its usage and the less resistance is exhibited in the form of preventing its use by students in classes. Hence, in order to promote faculty positive attitudes towards mobile technologies, they should be exposed to their various uses and trained to utilize them effectively in their classes (Zadok & Meishar-Tal, 2014).

As for the transferability of the current study, it was conducted in two colleges in which the current scope of mobile devices was relatively low. Hence, further large-scale studies in additional colleges may allow us to receive a larger perspective regarding informal usage of mobile devices in higher education altogether. It will also enable us to examine differences in faculty reaction based on the scope and availability of the devices in classes.

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REPOSITORY OF INSPIRING SCIENCE EDUCATION PROJECT ABOUT SPACE AND ASTRONOMY IN SCIENCE EDUCATION

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Abstract

Astronomy is one of the most exciting and rapidly evolving branches of science. Astronomy has influenced our history and culture through its practical applications and its philosophical and religious implications. Historically, not only scientists and students, but generally people are widely interested in the achievements and advances of space science. Space Science research seeks to increase our understanding of the solar system and the universe. In order to support teaching astronomy and space in science education, we present a brief description of ways in which classroom teachers can use the repository of the Inspiring Science Education project (ISE) to enhance space education and develop students' scientific inquiry skills in astronomy observations.

Introduction to the Inspiring Science Education portal

The Inspiring Science Education (ISE) portal (http://www.inspiringscience.eu) provides digital resources and opportunities for teachers to help them make science education more attractive and relevant to students' lives. Through the Inspiring Science Education website and the activities organised by the partners, teachers can help students make their own scientific discoveries, witness and understand natural and scientific phenomena and access the latest, interactive tools and digital resources from within their classrooms.

Key outcomes of the Inspiring Science Education project:

- Access to online, interactive tools and digital resources from all over the world that can be used for science teaching.
- Templates, scenarios and methodologies to support science teachers and teacher trainers in their effort to make their teaching more exciting, fun and relevant to students.
- A platform that can be used by students and teachers alike to take science teaching beyond the classroom and into the realms of extra-curricular learning
- A variety of eTools and digital resources that provide opportunities for students to collaborate with each other (in or out of the classroom) or with others outside of the class.
- Inspiring Science Education is all about providing the tools to make science education.

ISE is providing digital tools for space and astronomy in science education:

- Students are engaged in science education if they are "actively constructing knowledge from a combination of experience, interpretation and structured interactions with peers and teachers" (Roschelle et al., 2000; p.79), so they are more likely to gain an expert understanding of science concepts. Digital tools are one way to expose children to this type of learning. Indeed, as researchers have begun to understand more about the situations in which students learn best, they have found that "the structure and resources of traditional classrooms" are often inadequate and that "technology – when used effectively – can enable ways of teaching that are much better matched to how children learn" (Roschelle et al., 2000; p.79).
- Scientists routinely use a number of digital and technological tools in their daily practice, including virtual laboratories and simulations, models of scientific phenomena. While students are unlikely to have access to many of these tools in the classroom, they can use similar digital tools to work like scientists; by collaborating with their peers, modelling scientific processes, conducting virtual experiments, and actively participating in research with scientists locally and around the world. There are many choices in the repository of digital tools of the ISE for astronomy and space science education. STEM teachers could select what fits best the topic of astronomy, objects related to space, expected results, their students, their classroom, their curriculum, and their teaching style.
- Virtual Observatory Labs.

Robotic telescopes give STEM teachers access to astronomy data that they could include in many inquiry-based activities in many subjects (physics, chemistry, mathematics, environmental studies). The Las Cumbres Observatory Global Telescope as an education partner of the Global Telescope Network (LCOGTN) (http://portal.opendiscoveryspace.eu/content/las-cumbres-observatory-global-telescope-673563) demonstrates how a very complex scientific instrument works. The basic aim is to offer a fully supported education programme to encourage teachers and students to engage in research-based science education. Directions of how to use them as part of inquiry lesson plans are fully supported by a range of educational materials and a team of educators and professional astronomers. (http://www.faulkes-telescope.com/resources/videos/ft-lcogt_introduction). Also, in Education and Outreach links there are many recourses and examples that teachers could use in their classroom: http://lcogt.net/spacebook/, http://lcogt.net/opensource/, http://lcogt.net/observations/, http://lcogt.net/images/space/.

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Additional supportive material of LCOGTN

Agent Exoplanet is a virtual lab of LCOGTN that includes the ISE repository digital tools

(http://portal.opendiscoveryspace.eu/content/agent-exoplanet-677762)

Extra-solar planets (exoplanets) are an exciting branch of astronomy which has exploded in the last decade, with almost 1000 known exoplanets discovered in the Milky Way. This exploration is a triumph of human curiosity akin to exploring the world from out of caves. Agent Exoplanet is an interactive online resource in which you become the investigative astronomer. Using data from real telescopes from the Las Cumbres Observatory network, you can analyse planets which orbit stars other than our Sun. Using Agent Exoplanet, you will study already discovered exoplanets applying the exact same methods as astronomers to measure the changes in the brightness of a star whilst a planet moves in front or behind it. You can examine as many images as you like, making critical measurements which will reveal the size of the planet and how long it takes to go around its star.

Star in a Box is an analysis tool of LCOGTN that includes the ISE repository digital tools

(http://portal.opendiscoveryspace.eu/content/star-box-677868)

It involves an interactive Hertszprung Russell diagram which is included in the curriculum for UK Schools at GCSE, A level and also at undergraduate level. Siab is an interactive Hertszprung Russell diagram which plots brightness of stars against their temperature to show the different types of stars and their lifecycle from star formation to star death (this is based on a real published stellar evolution model). It allows the user to interact via looking at different information and reading values of stellar mass, temperature, age etc., as well as fundamentally seeing that the properties of their "model" star change as it ages. Students can plot their own graph and learn names of the stages of stars, e.g. main sequence, red giant etc.

Interactive tools from ESA Science missions

(http://portal.opendiscoveryspace.eu/content/science-esa-vodcasts-688290)

ESA Science Educational Support web pages offer an overview of educational material that has been prepared with the support of the ESA Science and Robotic Exploration Directorate (http://sci.esa.int/education/35001-interactive/). Telescopes for using in inquiry lesson plans on atmospheric effects or power of celestial bodies, animation with space travels, 3D models of galaxy, illustrations of observations in stars, simulations for searching planets, movies on the Formation of Planets and Asteroid Belt. To inform primary school pupils about space, ESA includes news, background information, animations, games and hands-on activities related to space. (http://portal.opendiscoveryspace.eu/content/esa-kids-677028). Also, on the website of ESA (http://www.esa.int/Education) there are many relative links with activities (Hands-on projects, Support to teachers, International cooperation activities, Opportunities for students, Outreach initiatives) that provide innovation approaches in space education.

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Virtual Reality tools

Celestia (http://portal.opendiscoveryspace.eu/content/celestia-676927) is an open-source free space simulation that explains the scientific process and lets you explore our universe in three dimensions. It has a large community of people producing resources using Celestia as a base and there is a repository of resources, educational and other, on: http://www.celestiamotherlode.net/.

Chromoscope (http://portal.opendiscoveryspace.eu/content/chromoscope-676928) for exploring the whole sky at a range of wavelengths on the website http://www.chromoscope.net/. It allows the user to view the sky at a range of wavelengths.

Dark Skies Rangers (http://portal.opendiscoveryspace.eu/content/dark-skies-rangers-677011) is a virtual reality tool cited in http://www.globeatnight.org/finding and demonstrates how scientists work and it helps explain the scientific process. Its goal is to raise the level of public knowledge about adverse impacts of excessive artificial lighting on local environments and help more people appreciate the ongoing loss of a dark night sky for much of the world's population. Toward this end, a range of programs and resource material have been developed.

Virtual labs

3D Games Based Go Lab Simulations (http://portal.opendiscoveryspace.eu/content/3d-games-based-go-lab-simulations-688294) support students in manipulating, testing, exploring, predicting, questioning, observing, analyzing and making sense of the natural and physical world. Labs will immerse students in rich 3D immersive environments where they will experience branching and unfolding learning journeys based on enquiry/investigation of various science topics such as Nature of Light, Environment and Climate Change, Electromagnetism, Energy/Renewable Energy, Geography and Geology, Health, Rain Forest, Mechanics.

Eyes on the Solar System 3D (http://portal.opendiscoveryspace.eu/content/eyes-solar-system-3d-677832) is a space simulation that lets you explore our universe in three dimensions. It has 3 major components: Eyes on Earth, Eyes on the Solar System and Eyes on Exoplanets.

Design a Space Telescope (http://portal.opendiscoveryspace.eu/content/design-space-telescope-831233) is a

Virtual lab that helps students explore the kinds of decisions the astronomers and engineers have to make as students design their own space telescope (http://chrisnorth.github.io/design-a-space-telescope/#).

Community of innovative practices

Community of Discover of Cosmos (http://portal.opendiscoveryspace.eu/community/discover-cosmos-70530) in the ISE portal brings together teachers who are using resources, virtual experiments and online labs from the fields of Astronomy. Also, STEM teachers could find digital tools

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(http://portal.discoverthecosmos.eu/repository/tutorials/astro) for the analysis of astronomical images, classification of elliptical galaxies, globular clusters and their ages, open clusters, estimating the mass and star formation rate in galaxies.

Digital Educational recourses

The portal of the Inspiring Science Education (ISE) project has developed the technical infrastructure for designing and delivering technology-enhanced interdisciplinary lessons following Inquiry Based Science Learning (IBSL) (Zervas & Sampson, 2015). Educational scenarios or lesson plans include a widely used inquiry learning model is the 5E Model, which lists five inquiry phases: Orienting & Asking Questions, Hypothesis Generation and Design, Planning and Investigation, Analysis and Interpretation, Conclusion and Evaluation (Zervas & Sampson, 2015). Each phase of the inquiry cycle includes a set of inquiry activities.

- Digital educational resources of any type (text, images, videos).
- External digital educational resources stored in the ISE Portal.
- External digital educational tools stored in the ISE Tools Repository.
- Guidelines/notes for the teacher to implement the inquiry activity.
- Assessment tasks to assess students' knowledge and provide feedback.
- Teachers should be able to add at the end of each inquiry phase appropriately (Zervas & Sampson, 2015).

Problem solving as a key component of IBSL

Chang and Weng (2002) suggest that a significant correlation exists between students' problem-solving ability and the science process skills in Earth and space sciences. The research indicates that learning increased measurably when students were educated in solving problems and then placed in situations requiring them to seek information, reflect on observations, and apply knowledge to new scenarios (Chiappetta, 1981). Thus, in each phase of the lesson plans ISE platform, there are two questions of PS in order to support teachers to be able to measure (among others) the effectiveness of IBSL.

Inquiry Based Learning Lesson Plans demonstrations

The Big Bang

In this lesson, students will learn the three main lines of evidence for the Big Bang: the universe is expanding, the Cosmic Microwave Radiation, and the mixture of chemical elements.

(http://portal.opendiscoveryspace.eu/edu-object/big-bang-836583)

Life cycle of Stars

Exploration of the lifecycle of stars, using an interactive web-app showing animations of how stars change over the course of their lives. (http://portal.opendiscoveryspace.eu/edu-object/star-box-scenario-test-demo-835896)

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Age of the Universe

Investigation of the age of the Universe by observating galaxies, finding their distances and their velocities, and finding that they are all moving away from us.

Is the Moon really larger when you see it on the horizon?

This Astronomy activity (Is the Moon really larger when you see it on the horizon?) on the UniSchooLabs repository was originally developed at the Harvard-Smithsonian Center for Astrophysics in the MicroObservatory project. It includes an opening challenge (described below) that sets up the context for students. Opening challenge:

> *"You're sitting on a beach, watching the Moon rise. It looks big — really big. A few hours later, when it's high in the sky, it looks a lot smaller. What's going on? You know the Moon itself hasn't shrunk. But is the image of the Moon on the horizon actually bigger? Or is your brain playing tricks on you? Your challenge is to design and carry out an experiment, using a remote telescope and its camera, to answer the question, 'Is the Moon really larger when it is near the horizon than when it is higher in the sky?" http://portal.opendiscoveryspace.eu/edu-object/moon-really-larger-when-you-see-it-horizon-838971*

Stars and Energy Transport

In this lesson, students investigate the primary ways in which energy is transported: convection, conduction, and radiation. (http://portal.opendiscoveryspace.eu/edu-object/stars-and-energy-transport-834772)

Building Constellations

This activity helps students identify a few constellations, realize what constellations are (areas in the sky) and their important role in the history of the mankind. Using the planetarium software Stellarium and Digital Universe, students will discover that stars on the same constellations are unrelated to each other and with a hands-on model they will understand why stars seem to be all at the same distance. (http://portal.opendiscoveryspace.eu/node/838964)

Following Curiosity Mars

The students will follow the rover Curiosity on its way to the red planet Mars by using the World Wide Telescope. The didactical approach is based on scientific inquiry in order to give students the enjoyment of finding out for themselves and initiates appreciation of the nature of scientific activity, of the power and the limitations of science. The main question will be: Where is Curiosity now? The educational activity will benefit from e-learning tools like WWT, and some web resources. Because students will have to solve a real problem of the humankind, they will have to accompany the rover Curiosity on Mars. The final product of

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the teams of students will be the presentation of the slide show (http://portal.opendiscoveryspace.eu/edu-object/following-curiosity-mars-837512).

Finding new a human house in outer space

The inquiry based approach consists of finding the real problems of living on this beautiful planet, Mother Earth, in order to start searching another house for humans on another planet from the Solar System. They will also use the World Wide Telescope for exploring the planets of the solar system and for building the slide show. Which planet of the Solar System is the most similar to Earth in order to send there a space colony? At least for the beginning, we will remain in the Solar System, but it is possible to go further one day. Present your ideas regarding the way to gain a new house for humans abroad Earth. What planet will you choose from the Solar System? http://portal.opendiscoveryspace.eu/edu-object/finding-new-house-humans-outer-space-838963

The Multiwavelength Universe

An introduction on the investigation of the electromagnetic spectrum from the point of view of astronomy. http://portal.opendiscoveryspace.eu/edu-object/multiwavelength-universe-836589

Gas Laws with Stars and Nebulae

In this Hangout, we will consider the gas laws and look at different kinds of nebulae. (http://portal.opendiscoveryspace.eu/edu-object/gas-laws-stars-and-nebulae-838970)

Digging into Comets

In this lesson, students investigate comets and explore how they brought water to worlds like Earth. (http://portal.opendiscoveryspace.eu/edu-object/digging-comets-838969)

Conclusion

The ISE portal supports many kinds of activities for learning and teaching astronomy and brings the scientific method in classroom. Astronomers understand the universe by comparing its observed appearance with the predictions of theories or models; they cannot understand stellar life cycles, for instance, by breeding star. As students study the methods of astronomers, they get familiar with an experimental and observational model in science that provides the scientific investigation (Percy, 2006). Astronomy is included in many interdisciplinary subjects in science for example, many concepts of physics (gravitation and relativity, light and spectra).

On the other hand, Space Science research seeks to increase our understanding of the solar system and universe. Four major themes in Space Science are: Astronomical Search for Origins, Structure and Evolution of the Universe, Solar System Exploration, and the Sun-Earth connection. Studying stars and planets we learn about the Sun and our own planet, the Earth. It also helps us to learn how stars, planets, and galaxies evolved and how the universe

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was formed. While students learn about the exploration of space and study astronomy, they deal with big ideas of Science:

- There are four fundamental interactions/forces in nature: Gravitation, electromagnetism, strong nuclear, and weak nuclear. All phenomena are due to the presence of one or more of these interactions. Forces act on objects and can act at a distance through a respective physical field causing a change in motion or in the state of matter.
- The Earth is a very small part of the Universe: The universe is comprised of billions of galaxies, each of which contains billions of stars (suns) and other celestial objects. The Earth is a very small part of a solar system with our sun in its centre that in its turn is a very small part of the universe.

Big Ideas of Science are a set of cross-cutting scientific concepts that describe the world around us. They allow us to conceive the connection between different natural phenomena that at a first glance may look irrelevant but in fact have their roots in the same principles and laws of nature.

The Earth and Space Sciences education is undergoing a remarkable transformation. Long perceived as a 'minor' science (in contrast to physics, chemistry and biology), the Earth and Space Sciences are emerging in both public perception and active science research as a profoundly important field. Our lives and future depend on the depth of our understanding of our home planet. The concept of the Earth as a rich and complex system of interconnected components and processes has become a dominant paradigm in science. Furthermore, the Space Age has provided a revolutionary new perspective on the Earth, enabling us to see, explore and investigate our world in ways never possible before (National Conference on the Revolution in Earth and Space Science Education).

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ONLINE MENTORING: STRATEGIES AND CHALLENGES

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Abstract

The increase in online graduate programs and the mentoring of students at a distance have led to the need to identify the challenges faced by online mentees and successful strategies used by online mentors in online mentoring. This research describes strategies and challenges in the online mentoring of dissertations in a doctoral program that was offered largely online. Data from semi-structured interviews with 19 mentees who graduated and five mentors provided insight into the strategies used by mentors, mentees and small groups and the challenges faced during the process of online mentoring.

Introduction

Supervising or mentoring during the dissertation process plays an important role in students' completion of dissertations (Lee, 2008; Maher, Ford, & Thompson, 2004). In doctoral programs that are offered partly or completely online, the development of research skills and mentoring of dissertations becomes more complex and challenging because mentors and mentees are often not in the same location. In the United States, the number of graduate online programs has increased dramatically since the turn of the century (Allen & Seaman, 2013, 2014). Blended and online doctoral education has also grown because of the increasing number of professionals pursuing terminal degrees and the increased mobility of students. In this paper we describe the mentoring of dissertations in a doctoral program that is largely offered online, but in which students attend an on-campus session each summer. The analysis of data from interviews conducted with 5 faculty members and 19 graduates provides insight into the strategies that can be used during online mentoring by professors and students, the challenges they face and the role of the institution in this process.

Literature review

Research conducted on doctoral mentoring categorizes mentoring activities as (a) educational development, which is content-focused formal and informal teaching, institution-specific program planning and advising, and provides opportunities for academic development; (b) psychosocial development, which is the social and emotional support that helps the mentee to persist, reflect on strengths and weaknesses and develop academically and professionally; and (c) professional development which is institution-, discipline- and individual-specific advice as well as opportunities and resources for becoming an expert in the discipline and integrating into the academy (Burnett, 1999; Crisp & Cruz, 2009; Hayes & Koro-Ljungberg, 2011). In the online environment, doctoral mentoring includes all of the above, but involves learning, advising, encouraging, promoting and modelling independent of time and distance in the online environment (Bierema & Merriam, 2002). Online doctoral mentors also have to manage "the interface between people," "their learning and developmental processes," and the "supporting technology" (Schichtel, 2010; p.251). They have to use multiple technologies and types of communication; be learner-centred, and be timely and constructive when providing feedback (Schichtel, 2010). However, doctoral supervisors or mentors have been found to be influenced by their own experiences as doctoral students, and by their concept of research supervision (Lee, 2008). Given that most mentors' doctoral experiences were probably not virtual, and that they had a traditional experience, it can be difficult for them to mentor dissertations online. Major challenges to online mentoring have been identified as problems of miscommunication, technical problems, privacy problems, difficulties in developing a relationship online compared to in person, the need for multiple competencies such as the technical, communication (written and spoken in the virtual environment), and managerial skills (Ensher, Heun, & Blanchard, 2003). At the same time, the use of a cohort model has been reported as a valuable model of doctoral supervision that helps students complete their dissertations, overcome research challenges more easily and form relationships in diverse groups (Burnett, 1999; Johnson & Huwe, 2003; Maher et al., 2004). There is a scarcity of literature about online doctoral education, although research on traditional doctoral education abounds. Simultaneously, the goals of a doctoral program, the complexity of academic, research and professional development in the mentor-mentee relationship, and the requirements of a doctoral dissertation make online mentoring in this context very different from a corporate mentor-mentee process, about which much has been written. This research attempts to explore the experiences of online mentors and mentees in a doctoral program in order to identify strategies that might help others embarking on this process.

Context and research methodology

This study took place in a largely online doctoral program in education for adult professionals from various educational environments. The curriculum comprises two years of required online coursework and seminars as a cohort, yearly summer sessions lasting four days, qualifying exams, and the individual dissertation process with a mentor. Compared to other programs where students enter the program working with one mentor from the beginning, students have the opportunity to complete coursework with 4-6 professors so that they are exposed to foundational theory and research in the discipline, various ways of mentoring, and different types of activities and projects. Students live and work in many parts of the United States as well as abroad, therefore the initial coursework is necessary to ensure they are prepared for independent research during the dissertation. During the second year, students work with a faculty member with similar research interests. Students in the program are working professionals, therefore their research is mostly research-relation oriented. Franke and Arvidsson (2011) described doctoral research supervision as either research practice-oriented or research relation-oriented. In the former, the mentor and student participate in a common research practice and the mentor creates opportunities for the student to participate

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in the common research. In research relation-oriented supervision, the mentee chooses the research problem that is related to the mentor's research and research interests, but they do not participate in a common research practice. The mentor guides the mentee's activities, learning, research, and dissertation. This latter model was used in the doctoral program that is a focus of this research. Mentors used various technologies and strategies in the online environment to guide students in the conceptualizing and conducting of research, analysis of data and the writing of their dissertations.

This research was guided by a phenomenological framework that focused on capturing the lived experiences of the participants, namely, the mentees and mentors in the program. Phenomenology is appropriate for qualitative research in educational technology because experiences in online environments are an important area of inquiry (Cilesiz, 2011). Following the graduation of the first nine students, interviews were conducted with the five faculty members who mentored the dissertations. Additionally, the dissertation experiences of graduates of the doctoral program were explored using semi-structured interviews. A total of 24 students were contacted after graduation, of whom 19 voluntarily participated in the interviews about their experience with online mentoring during their dissertation and the challenges they had faced. The interview data were analyzed using an inductive analysis method, where the researchers move from "specific to the general" (Hatch, 2002; p.161). After transcribing the interviews, two of the authors coded the data independently and then compared codes for percentage agreement. The data from mentors and mentees were first analyzed as separate datasets and then combined. A constant comparative analysis was utilized to compare data across interviews, looking for similarities and differences (Glaser & Strauss, 1967).

Findings

The analyzed findings from mentor and mentee data are presented here in four areas – mentor strategies, mentee strategies, peer strategies and institutional strategies.

Mentor strategies

The mentors and mentees described the role of the mentor and the strategies used by the mentor in the online environment to be extremely important for both dissertation progress and completion. Mentor strategies fell in the following areas:

Choosing and using appropriate technologies

Both mentors and mentees described the use of multiple synchronous and asynchronous online media by mentors for different purposes such as group meetings, feedback on writing and peer discussions that were valuable and contributed to the process.

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Providing structure but being flexible

Online mentors provided deadlines, collaboratively set goals with their mentees, created a timeline, and explained clear expectations (Kumar, Johnson, & Hardemon, 2013). At the same time, both mentors and mentees found it important to communicate if there were changes and flexibility was needed.

Providing feedback

Mentees provided examples of the types of online feedback that they found valuable or not so useful in the online environment from faculty. They preferred timely and candid feedback that pointed out strengths and weaknesses in their research design and writing (Kumar, Johnson, & Hardemon, 2013).

Providing resources

The mentors and mentees did not meet face-to-face, therefore it was important to model writing and research design. Mentors found it important to provide examples of dissertations and literature, and mentees confirmed that these were very useful to them. They also appreciated the additional resources or contact with other researchers due to the mentor.

Providing moral support

Mentees sometimes had problems at the research site or with data collection and analysis. They found it important to find ways to communicate with their mentor online when things did not go as planned. Thus not only research support but sometimes moral support provided by mentors was very valuable, mentors stated that being available and being able to listen online helped the mentees.

Mentee strategies

Although the technologies used by the mentor and structure provided by the mentor were crucial for online mentoring, mentees also needed certain strategies to be successful during the process. Both mentors and mentees discussed the importance of communication, that it is important to *establish an online communication* channel that works for both parties, but that the mentee should take the initiative and contact the mentor, or provide updates to the mentor, and not wait for the mentor to reach out. Similarly, the mentee also has equal responsibility when it comes to *organizing meetings* and *requesting feedback*. Mentees provided several additional suggestions about the management of research and writing that can be useful when completing dissertations at sites that are at a distance from the university (Kumar, Johnson, & Hardemon, 2013).

Group strategies

Peer support and feedback played an important role in the online environment, helping students stay focused, share their research and finish their dissertations. During the first year of the cohort-based program, students were organized into smaller online groups of 3-5 students with similar research interests. During the dissertation, similar online groups

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supported each other through the process, read each others' drafts, provided feedback and motivated their peers. In the online environment, these groups acted as *virtual research groups* that mentees found extremely valuable to their progress, especially due to their family and work commitments. Often, these groups were mentored by the same person, in which case the mentor sometimes organized the online meetings and discussions, structured the peer feedback and also provided feedback in a group setting.

Institutional strategies

In an on-campus program, students can go to different offices or meet people who will help them with paperwork, but in an online program, resources and services have to be in place so that online students can also successfully navigate the administrative requirements at the academic institution. Mentees in the program in this study had access to an online advisor who helped them in these areas, but they suggested that more online resources could be made available. Information literacy instruction and guidelines for accessing library resources online were provided and appreciated by mentees in this research. Similarly, workshops are often available on a campus in academic writing or in Institutional Review Board (IRB) procedures that are important for writing a dissertation and conducting ethical research. Mentees in our research stated that online instruction or tutorials in such areas were useful to them and should be available for students writing a dissertation at a distance from the university.

Online mentoring challenges

Although the mentors had experience teaching online (ranging from 2 to 6 years), they were mentoring dissertations online for the first time. The main challenge they faced was to identify the types of communication that would enable them to provide feedback and have discussions that conveyed what they wanted to say and mentor students successfully. For mentees, time management, work-life balance, and the motivation to continue writing their dissertations were the main challenges that were faced (Kumar & Johnson, 2014). These challenges are not unique to the online environment. Five of 19 mentees expressed a need for face-to-face interaction, and that they did not find online communication sufficient during the dissertation process. However, the other mentees were quite satisfied with the online interactions. Mentees also mentioned challenges with implementing research, data collection or analysis, which are also not challenges that are exclusive to the online environment.

Discussion and lessons learned

The dissertation process is challenging for all students, even those who are mentored in an on-campus setting and have the advantage of an apprenticeship model, working alongside their research mentor. In the online environment, the mentoring process becomes even more challenging because mentees cannot just meet with the mentor in their office. Online doctoral programs in the United States constitute online coursework before the dissertation, making it possible to establish certain methods of communication, build relationship between mentors and mentees in a structured environment, and build community that can lead to peer support

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networks during the dissertation process. Although this research was conducted in a very specific context and in a doctoral program, we believe that the results have implications for graduate online mentoring and can be adapted by others wishing to engage in the online mentoring of research and projects in an academic institution.

At the beginning of this research, the focus was on the strategies used by online mentors that are successful and can help mentees in the online mentoring process. The results of the first seven interviews with mentees, however, made it apparent that although mentor strategies were important to provide structure, guide research and provide valuable feedback in the online environment, mentees were also using strategies that were essential for a successful process (Kumar, Johnson, & Hardemon, 2013). The results of interviews with the mentors reinforced the mentee results, because mentors believed that despite the strategies that they used, communication in the online environment and the process of research largely depended on the mentee, their research, their organizational skills and their communication of progress. These findings resonate with research on self-regulation (Zimmerman, 2001) and learning presence in the online environment (Shea & Bidjerano, 2010), where learners manage and self-direct their learning. While it is important to provide scaffolds and structure in the online mentoring process, it is a collaborative endeavour with both parties contributing to its progress. Identifying and communicating the roles of both parties in the online mentoring process is important to the success of the process.

In the interviews with mentees that followed, other variables that influenced the online mentoring process emerged. The program that was studied was cohort-based, that is, students completed initial online courses as a group, and the online program was designed to facilitate the building of community among the cohort (Kumar, 2014). Additionally, smaller groups of students with common research interests were encouraged to work together and meet regularly online. These strategies were found to have influenced the dissertation process where groups of students continued to support each other. Mentors also continued to use strategies that structured peer feedback and the sharing of resources. These small group strategies provided an additional layer of support in the online mentoring process. Finally, the online support services and online resources available at the institution were needed both by the mentees as well as mentors for the process to succeed. Often, online mentoring is perceived to be dependent solely on the mentor and the mentee, and the institutional role is taken into account more in structured learning environments such as online courses. While mentor and mentee strategies continue to be of paramount importance in online mentoring, the lack of institutional support can make procedures and the process more tedious and challenging for both the mentor and mentee, especially in academic environments.

Conclusion

In the context of increased online programs and growing prevalence of online mentoring for research and projects, research on strategies that can facilitate this process is necessary in the academic context. Much of the research that exists is in training environments or in the medical field, or focuses on the building of software that supports online mentoring, which,

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albeit valuable, do not fulfill the need in institutions of higher education where professors and students engage in online mentoring. The identification of challenges faced, and strategies that succeed or resolve those challenges can be helpful to all those engaged in online mentoring.

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"FIRST IN LINE" STUDENT ASSESSMENTS OF PIONEERING EXAMPLES OF BLENDED LEARNING

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Introduction

This paper presents a study of how a cohort of students respond when they encounter a single module delivered via a blended/flipped learning approach at a point when the rest of their learning occurs in more traditional face-to-face learning environments. The study is based on a case study at the School of Communications, Dublin City University where the author has pioneered online delivery of module content blended with F2F moderation of small-scale seminar sessions based on the online content. The paper introduces the practical difficulties – for both tutor and student – of "being first" in the sense of creating course content and learning to interpret/process content delivered in a non-traditional fashion. The paper presents data on:

- student engagement based on seminar attendance rates,
- metrics on consumption of online videos,
- performance in assessment,
- feedback from questionnaires, and
- from small-scale focus groups.

Context for introducing online learning modes

In September 2015, the current author introduced what constituted the first attempt to adopt a flipped classroom approach in his institution, the Faculty of Humanities and Social Sciences at Dublin City University. The motivation for this was partly derived from a strategic aspiration at an "official" (i.e. senior university management) level for staff to adopt blended learning methodologies with a view to improving student recruitment by offering more flexible delivery modes. However, the decision to "flip" was also driven by more pressing and pragmatic thinking. Although the post-2008 global recession has affected much of the western world, its effects were particularly acutely felt in the Republic of Ireland which in 2010, accepted a fiscal bailout from a troika constituted by the World Bank, the IMF and the European Union. Accessing bailout funds was conditional on achieving significant cuts in national public expenditure levels. This included cuts on funding to the Irish Higher Education Authority and, indirectly, to third level institutions: between 2008 and 2015, state funding for universities was cut by nearly 50%, leading to a decline in staff numbers (O'Brien, 2016). At the same time the total number of student attending third level increased from approximately 130,000 in 2009 to 147,000 in 2014. This has inevitably lead to larger class sizes. Between 2009 and 2011 alone, according to the Irish Federation of University Teachers, the average staff:student ratio across third level institutions in Ireland rose from 1:19 to 1: 24.

In my institution, modules which were already taught to large groups (100 plus students), the additional increases in class sizes strained the physical capacity of the institution. For example, this writer witnessed one module for first year undergraduates on media history (CM137), grow from approximately 80 students in 2005 to 280 by 2013. Given the limited number of spaces capable of holding such numbers, that module was increasingly – but necessarily – timetabled in unpopular time slots (typically late on a Friday evening) with a deleterious impact on attendance. Post-semester focus groups exploring poor attendance found that timetabling issues exacerbated a sense of lecturer-student alienation caused by the large class sizes. Students complained that the large class size limited opportunities for lecturer-student engagement and that there was little sense that the lecturer and students were operating in a shared intellectual space: the lecturer was experienced as literally and figuratively distant. The resulting lack of engagement created serious attendance issues which seemed to have been – at least indirectly – correlated with worsening student performance in assessment.

Solution?

Online delivery of lecture content appeared to offer the prospect of addressing the timetabling issues, allowing students the flexibility to choose the time, location and speed at which they consumed lecture content. However, cognizant of the potential for further disengagement stemming from an exclusive reliance on online means of lecture delivery, I considered how this might be addressed. Kim and Thayne (2015) emphasize how relationship-building strategies between instructors can learners can "positively relate with increased learning gains". To that end, I decide to adopt a flipped approach. From September 2015, the previous 2-3 hour *live* CM137 lectures have been replaced with online lecture delivery. To build a direct relationship with the students, the lectures were augmented by weekly face-to-face seminars moderated by the course coordinator and built around questions relating to the previous week's online lecture. Though still large (30 students), the seminar sessions not only dramatically increased the potential for instructor-student interaction but, inter alia, created an opportunity to build at least a minimal direct connection between Faculty and the students.

In contemplating the options for creating the online lectures I looked at existing literature on best practice and reviewed the options in Hansch et al.'s (2015) survey/assessment of different video and online learning methodologies. In this regard, the fact that I come from a film and television studies background but also that the audience for my content were media and communication students, arguably created a particular set of expectations regarding the quality and nature. In other words I assumed that, as individuals well-versed in screen culture, media students might be less tolerant of less-than-professional content. Based on responses to a number of short test videos, I abandoned the idea of creating *filmed lectures* (i.e. literally filming a live lecture and editing in accompanying Powerpoint material, as per content creation software like Panopto). In addition, bearing in mind Kouni's (2006) argument that

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video in education is effective when its cognitive, experiential and nurturing qualities are actively exploited, I decided on an online form which emphasized the audiovisual demonstration of core themes. The final result was a series of straight to camera talking head videos extensively augmented with audio, video, audiovisual, textual and hyperlink content. Thus the experiential value of video was exploited in a discussion of the revolutionary impact of the printing press illustrated with video of how Gutenberg's original press actually operated. Similarly the nurturing potential of video was utilized when discussing the concept of commercial intertexts in mainstream cinema by filming myself opening a box of *Star Wars toys* from my own childhood.

Each lecture is broken down into a series of 6-20 minute duration video presentations which are "released" to students every Wednesday. Students can download the videos from the Loop page or watch them via a private Youtube page. This allows students to access the course content at a location, time and pace of their own choosing. The online videos are produced using Camtasia, which permits blending of straight to camera video and audio, Powerpoint presentations, web content etc. into a video presentation.

The key question addressed in the proposed paper is whether the adoption of this mode resulted in improved student outcomes. To this end, in addition to briefly recounting practical issues associated with adopting the flipped mode (in a university context where such modes are scarcely employed and where HR/workload policies remain grounded in an era of F2F teaching – i.e. where the labour involved in online content creation cannot be recognized and acknowledged) the paper will present metrics measuring the student experience of the flipped approach based on a multiplicity of perspectives:

1. Measurement of student attendance and participation in weekly face to face seminars.
2. Detailed analysis of student consumption of online videos (overall views, percentage of students watching the videos, percentage of videos watched to their conclusion etc.)
3. Anonymous student feedback through detailed module-specific online Survey of Teaching tool (with 72% response rate.)
4. Results of follow-up post-semester Focus groups with CM137 students to clarify and expand results of online Survey of Teaching tool.
5. Student performance in continuous assessment and exam assessment modes.

Without going into detail in this proposal, the results suggest that the experiment has been broadly successful in terms of engagement and learning outcomes. However, the experiment also highlights the practical issues raised for pioneers of such approaches in contexts where – official strategy notwithstanding – the institution has not developed new working structures in anticipation of the introduction of such delivery modes.

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OPENING UP HIGHER EDUCATION: QUALITY ASSURANCE FOR INNOVATIVE APPROACHES

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Opening up Higher Education

The rapidly changing world of the 21st century is putting ever-greater pressure on people to acquire the knowledge and skills that will help them live productive and fulfilling lives. Young people realise that higher education is the key to good work opportunities and those already employed understand the need constantly to upgrade their competencies. All this is creating both challenges and opportunities for higher education institutions (HEIs), which are adopting innovative approaches in order to open up to these new demands. HEIs are becoming more 'open to people, open to places, open to methods and open to ideas', in the words of the slogan of the first open university, established almost 50 years ago.

The various ways in which HEIs are opening up pose challenges not only to their own established ways of operating, but also to the systems, both external and internal, that are in place to assure the quality of their provision.

A first way that institutions are opening up is by relaxing, if not completely eliminating, their historic requirements for admission. This is particularly true for admitting older students already in work. It has been proved abundantly that an adult who is determined to acquire new knowledge and skills can very quickly make up the background that was once a pre-requisite for entry to the programme. In such a case older forms of quality assurance, which used the entry qualifications of incoming students as a measure of quality, are clearly irrelevant.

A second avenue for opening up higher education is the adoption of new methods. Distance education is not new, but the Internet, and the new technologies that it spawns almost monthly, have the potential to make it vastly more ubiquitous and effective than it was in the 20th century. Yet older criteria for judging quality, which looked at the facilities on HEI campuses, such as library holdings and laboratory facilities, are much less relevant to this new world.

The curriculum is the third area where HEIs are opening up their provision. The skills and knowledge required for work in the 21st century are constantly changing. In order to prepare their students for these evolving demands HEIs need to engage people from the workforce, who are competent in those areas, to teach them. The great importance of these part-time instructors means that another traditional criterion for measuring quality in higher education, the qualifications of the full-time academic staff, no longer have quite the same importance.

All this is leading quality assurance systems, which once focussed mainly on inputs to HEIs and then evolved to include reviews of their internal processes for teaching, to focus on the basics. These basics are the students' learning outcomes. No matter what the students' earlier academic backgrounds, no matter what methods were used in the teaching/learning process, the question is, 'what can the students do now that they could not do before they took this course'?

But even that does not capture the full scope of the innovation that is taking place. While all teaching has a purpose and aims to give new skills and knowledge to students, some innovative approaches do not verify what students have acquired in any formal way. Open Educational Resources (OERs) enrich the universe of accessible knowledge in remarkable ways, yet they do not carry external assessment. Similarly most MOOCs (Massive Open Online Courses) include informal tests and quizzes but most students do not seek to acquire any formal certification of what they have learned. Yet those who produce OERs and MOOCs would like to be able to assure the public that their offerings have been developed in a serious and systematic way and represent the state of the art in the subjects they purport to teach.

All this means that innovative approaches to open up higher education also require new approaches to quality assurance. This paper reports on three projects that respond to this need.

A Quality Platform for Innovative Providers: Focus on Learning Outcomes

The first project is a Quality Platform developed in 2012 by the Council for Higher Education Accreditation/International Quality Group (CHEA/CIQG) as a form of external review of the quality of alternative/innovative providers of higher education that are not part of the traditional higher education systems or quality assurance frameworks. The Quality Platform reviews these providers for their performance and quality and it can be used nationally and internationally. The Platform is designed as a response to an emerging new sector of higher education, offerings from private companies and other organizations, often online, now available alongside the provision of traditional colleges and universities. The primary intent of the Quality Platform is to assure and improve quality as this sector develops and serves more and more students. It is an outcomes-based review using standards established by the Platform, a self-review by the provider and peer (expert) review. If successful, the provider is designated as a *Quality Platform Provider* by CHEA/CIQG for a three-year period.

The Quality Platform is based on four simple standards, summarized as follows:

1. Learning outcomes are articulated and achieved: The provider organizes its work, determines the content of offerings and sets expectations of rigor based on anticipated and actual results for students who enrol: information about gain in skills, competencies or other attributes resulting from a learning experience.

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2. Learning outcomes meet postsecondary expectations: The provider demonstrates that the articulated and achieved student learning outcomes are consistent with expectations of student learning at degree-granting colleges and universities.
3. Curricula provide opportunities for successful transfer of credit: For the provider's offerings intended to be used for credit or credentialing at a college or university, the provider: (a) Builds opportunity for student progression beyond its offerings as part of its curriculum development; (b) Organizes offerings into a coherent learning experience that can be sustained across multiple providers of higher education.
4. Transparency is maintained and comparability is established: The provider develops and provides reliable, easily accessible and readily understandable information to the public, at least annually, about its performance: (a) An aggregate description of the student learning outcomes that are achieved; (b) The results of comparisons of performance among similar types of non-institutional providers; (c) An aggregate description of the uses of the offerings to students, for example, advancing toward an educational goal, employment.

The self-review by the provider is based on a template providing evidence that each of the four standards have been met. The self-review is the basis for an external review and a site-visit by a team of experts. The acceptance of the report by CHEA/CIQG is the basis for the award of the Quality Platform Provider Certificate.

Colleges and universities could use the Quality Platform designation as an indicator of quality when considering the award of credit or recognition. Quality assurance agencies could refer the Quality Platform in reviews of these providers that they might conduct.

The Quality Platform was pilot-tested in 2015 with the DeTao Masters' Academy in Shanghai, China. DeTao is a private company set up in 2012 with the aim of developing innovative educational programmes, which go beyond conventional educational approaches and are not part of the traditional higher education system in China. The programmes are designed and implemented with the guidance of teaching staff, most of which are from outside China (designated as *Masters* by DeTao) with distinguished academic or industry backgrounds in a wide variety of disciplines. DeTao works in partnership with the Shanghai Institute of Visual Arts (SIVA) by providing Advanced Classes to a selected number of students. Since DeTao Advanced Classes do not lead to a degree but can be thought of as an enriched major to programmes offered by SIVA, they are not covered by traditional QA frameworks in China nor are they part of the traditional higher education system.

In order to acquire recognition of the quality of their offerings, DeTao applied in April 2015 to CHEA/CIQG to undergo the Quality Platform review. A self-evaluation was carried out by DeTao from June to September 2015, based on the standards of the Quality Platform. After the examination of the Self-Review, an external review team of three members, one from China and two from outside, was set up for the site-visit. Their expertise covered quality

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assurance processes, learning outcomes and the Chinese evaluation systems. The expert team reviewed the DeTao Advance Class Offering in November 2015 and interviewed different stakeholders: Masters, teachers, coordinators, students and administrative staff. The expert panel also had an opportunity to see students' work in the exhibition hall of the DeTao building before beginning the interviews and interact informally with students and staff prior to the official review, which proved beneficial. Two members of the panel interviewed one of the leaders of the Shanghai Institute of Visual Arts (SIVA), a partner institution to DeTao Masters' Academy and an external partner to get views from different stakeholders.

The expert team produced a report with recommendations to CHEA. After reviewing the report in December 2015, CHEA awarded DeTao Masters Academy, a Quality Platform provider certificate at a ceremony during the CHEA Annual Conference on 26 January 2016.

The Quality Platform process proved to be very beneficial for DeTao Masters Academy in a number of ways. First, the Self-Review helped DeTao develop a common framework for the Advanced Classes based on learning outcomes. Second, it introduced the concept of learning outcomes as a new approach in China that may well have an impact on future developments in the more traditional approaches to evaluation.

On the basis of this experience, the Quality Platform is now being piloted by CHEA/CIQG with other providers, some of them offering programmes online.

A Guide to Quality in Online Learning

The 13th Babson Report on online learning in the US (Babson, 2016) concludes that distance education is clearly becoming mainstream because more than one-quarter of higher education students are now taking a course online. In addition, one of the positive consequences of MOOCs – and the fact that elite universities around the world engage in them – is that the perception of the quality of online learning is changing.

In view of the above, assuring the quality of online learning is a continuous challenge. This inspired the second project that we report on, the publication of *A Guide to Quality in Online Learning* (Butcher & Wilson-Strydom, 2013) by Academic Partnerships. This Guide distils the extensive existing experience and research on the topic in an easily readable format through 16 Frequently Asked Questions (FAQs). FAQ 3: *What constitutes quality in online learning?* summarizes key aspects of quality in the online experience under the headings: institutional support (vision, planning and infrastructure); course development; teaching and learning (instruction); course structure; student support; faculty support; technology; evaluation; student assessment; examination security.

One of the concrete examples provided is the Quality Matters Program (https://www.qualitymatters.org) in the USA, which has established national benchmarks for online courses. Central to the QM is the concept of alignment, which is evident when learning objectives, measures and assessment, educational materials, interaction and engagement of learners, and course technology ensure the achievement of learning objectives.

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A strength of this Guide is that it provides other numerous examples from around the world: benchmarks of the Australasian Council on Open Distance an e-Learning (ACODE), guidelines to improve the quality of online offerings by the Asian Association of Open Universities (AAOU) and useful approaches for staff development in support of online learning such as those used by the University of South Africa (UNISA). A very useful Annotated Reading List on Benchmarks further reinforces this Guide to Quality in Online Learning.

A Guide to Quality in Post-Traditional Online Higher Education

Reactions around the world to the 2013 Guide to Quality in Online Learning were very positive. However, since it appeared at a time of intense press coverage of massive open online courses (MOOCs) there was demand to prepare another document to explore quality issues in less formal types of online learning than those covered by the 2013 Guide. In the year that followed alternative, innovative or 'post-traditional' approaches to higher education had continued to multiply. These include a greater openness in access to higher learning and a growing diversification of teaching and learning methods and content, such as MOOCs, OER, Open Badges, Experiential Learning. This led Academic Partnerships to commission the 2014 Guide to Quality in Post-Traditional Higher Education (Butcher & Hoosen, 2014).

The Guide looks at what is meant by post-traditional higher education and reviews the main manifestations of *openness* in higher education before addressing the issue of assuring quality. We shall now look how approaches to the quality assurance of MOOCs and OER in more detail as presented in this Guide and other literature.

QA and MOOCs

The quality assurance of MOOCs is a very topical question, especially at the receiving end in developing countries. Since learners are everywhere, countries want to know which MOOCs would be of greatest value in their contexts. But, because MOOCs do not offer credit and do not lead to qualifications, traditional quality assurance frameworks are not interested in them and do not include them in their reviews.

A MOOC is a Massive Open Online Course. Open Educational Resources were the long fuse that detonated the MOOCs explosion. The fuse was lit when MIT started putting its professors' lecture notes on the Web in the late 1990s. Meanwhile, the University of Manitoba, Canada, first used the term MOOC for a course called *Connectivism and Connective Knowledge* in 2008. Two thousand members of the public took the course free online.

But MOOCs really made news in 2012 when elite American universities like Harvard, Stanford and MIT offered MOOCs based on a very different educational philosophy and pedagogy. Since then there has been a stampede to join the MOOCs craze.

One development is that although they originated in North America, MOOCs are no longer just a North-American phenomenon. A range of MOOC providers is appearing around the world and the languages in which MOOCs are offered are diversifying. European Multiple

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MOOC Aggregator (EMMA) and FutureLearn are just some examples of numerous European providers.

Let us now look at how MOOCs – and online learning generally – challenge traditional practices of internal and external quality assurance and accreditation. There is bad news and good news.

The bad news is that since most MOOCs are shorter than normal courses and do not carry credit, most universities have only skimpy academic procedures for giving approval to offer them to a department or an individual. Moreover, since they essentially by-pass internal QA processes, external QA systems have also taken little interest in them – at least so far.

The good news, of course, is these relaxed approval processes give institutions a chance to test innovations without having to submit them for approval to conservative academic governance bodies and engage in the standard intra-institutional bargaining needed to get new initiatives going.

Institutions offering MOOCs – and sometimes also those offering traditional online learning – often partner with external enterprises (both for-profit and not-for-profit) to help them. MOOCs require IT systems that can cope with very large number of learners and those offering traditional programmes online may need help with setting up distance learning systems.

Fresh approaches to quality assurance are needed for the emerging innovations that we call *post-traditional* higher education. These would address innovations such as MOOCs, OER, Open Badges, and the assessment of experiential and prior learning.

To respond to this need, a new initiative has recently been launched: the European Alliance for Quality of Massive Open Online Courses – MOOQ. The main objective of MOOQ is to develop a quality reference framework for the evaluation of MOOCs by integrating different quality approaches.

Quality and OER

The issue of assuring quality of OER is even a greater challenge.

The 2014 Guide begins by quoting Wiley (2013), to the effect that the open licence does not necessarily guarantee that an OER will be *fit for purpose*. The decentralised nature of OER creation remains a major challenge. Key issues are how to make the process more transparent and how quality can be maintained over time. The openness and flexibility of use, modification and re-use of OER further exacerbate this challenge.

Recent research (Orr, Rimini, & van Damme, 2015) demonstrates that different institutions and networks have tried to address the quality assurance of OER. A key requirement seems to be the development of relationships of trust between the producers and the users of OER. Another solution, used by the UK Open University is to release “beta content” and revise the

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OER after feedback. Others argue that creating collaborative communities to improve quality and relevance of OER is an efficient way of assuring quality through peer review. The need to adapt learning materials to specific educational contexts is also proposed as a quality requirement.

Aligning OER with common learning standards used in educational systems is another approach used by institutions. One example is the Dutch repository of educational materials, Wikiwijs, which is aligned to learning outcome plans. Another example from the US is the Common Core State Standards, which refer to the expected outcomes in mathematics and English, used, among others, by the Khan Academy's repository for educational resources. A project at the University of Leicester uses fixed quality criteria for OER as does, more comprehensively, the Tidewater Community College in Virginia. The College's policy is based on the requirement that academic staff cannot develop or teach an OER-based course unless they have undergone training and learning outcomes have been specified. Furthermore, any changes of up to 10% of the content of an accredited course require a new quality assurance review.

Despite the practices noted above, concerns about quality remain a barrier to using OER. There is an urgent need to rethink quality assurance mechanisms so as to make them more open and to apply standards for ensuring that what is learnt using OER is recognised in formal education.

Conclusion: Quality rests with the provider

This brings us to our concluding remarks. Opening up higher education has posed challenges to quality assurance and even to the definition of quality in higher education. However, certain fundamental principles underpin all forms of higher education, no matter what the curricula or delivery mode. Seven International Quality Principles were articulated in 2015 by CHEA/CIQG as follows:

1. Quality and higher education providers: Assuring and achieving quality in higher education is the primary responsibility of higher education providers and their staff.
2. Quality and students: The education provided to students must always be of high quality whatever the learning outcomes pursued.
3. Quality and society: The quality of higher education provision is judged by how well it meets the needs of society, engenders public confidence and sustains public trust.
4. Quality and government: Governments have a role in encouraging and supporting quality higher education.
5. Quality and accountability: It is the responsibility of higher education providers and quality assurance and accreditation bodies to sustain a strong commitment to accountability and provide regular evidence of quality.

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6. Quality and the role of quality assurance and accreditation bodies: Quality assurance and accreditation bodies, working with higher education providers and their leadership, staff and students, are responsible for the implementation of processes, tools, benchmarks and measures of learning outcomes that help to create a shared understanding of quality.
7. Quality and change: Quality higher education needs to be flexible, creative and innovative; developing and evolving to meet students' needs, to justify the needs of society and to maintain diversity.

Two principles particularly resonate with the topic of our paper. First, principle 1 states that "assuring and achieving quality in higher education is the primary responsibility of higher education providers and their staff". This applies both to face-to face and online provision of higher education. Quality assurance will have to adapt and become more flexible and creative – as stated in principle 7 – to keep abreast with the dynamic diversification of higher education provision as it opens up in multiple ways.

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QUALITY CULTURE IN BLENDED LEARNING: SELF-ASSESSMENT AS A DRIVER FOR CHANGE

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Introduction

This paper proposes a methodology for self-assessment of online and blended learning programs (OBL) in adult education at the institutional level. It is based on applied research on the quality of OBL in formal adult education and continuing vocational education training, funded by the Flemish government (Belgium): the 'Adult Learners Online! Blended and Online Learning in Adult Education and training (ALO!)' (http://www.iwt-alo.be).

Adult education centres in Flanders offer education for a highly diverse audience. Due to its flexibility of access and learning modes, blended learning is becoming more and more attractive for adult learners, especially for those who have to combine their studies with work, family and social responsibilities.

Not only the learners but also the institutions of adult education are characterized by great diversity. The number of enrolled students can vary substantially, as well as the amount of OBL programs they offer. Some centres have more than 10 years of experience with blended learning programs, while other institutions are in the early stages of adopting OBL in their programs. Given this diversity, a contextualized quality approach is required.

In the first section of this paper, we explore the literature on how a quality culture can be supported and implemented in education and how self-assessment procedures can support this implementation. In a second section, the construction of a contextualized self-assessment methodology for adult education centres is described. In the last part of this paper, we suggest future directions for our research.

Literature review

Quality culture

Since the European University Association (EUA) introduced the concept of quality culture as an important element of internal quality assurance for higher education (Quality Culture Project 2002-2006: EUA, n.d.), quality culture has become a taken-for-granted concept in higher education (HE), although some authors are convinced that the concept of "quality culture in HE settings should be used with caution" (Harvey & Stensaker, 2008).

The EUA Quality Culture Project states that "quality culture refers to an organisational culture" (EUA, 2006) and exists of two distinct but complementary elements: "shared values, beliefs, expectations and commitments toward quality" and "a structural/managerial element with defined processes that enhance quality and aim at coordinating efforts" (EUA, 2006).

The last decade, a number of researchers started to focus on the conceptualisation of quality culture because they perceived a lack of conceptualisation op the phenomenon.

Harvey and Stensaker explore the concept of quality culture in relation to research on culture and how "culture became the umbrella term for all possible intangible factors" (Harvey & Stensaker, 2008) in management literature on organisational culture. They are concerned with the fact that culture is often seen as something that can be designed and can be imposed in organisations. Harvey and Lee reveal the complexity of quality culture and explore the concept in a dialectical framework with the dimensions *degree of group control* vs. *intensity of external rules* and define 4 ideal types of quality culture. They conclude that quality culture should be a tool for reflection on "asking questions how things work, how institutions function, how they relate to external influences and how they see themselves" (Harvey & Stensaker, 2008).

Harvey builds on that framework and is cautious about the emerging view that "quality culture is about the development of, and compliance with, processes of internal quality assurance" (Harvey, 2009b). He is holding a plea to "entirely disengage the development of a quality culture from sets of assurance procedures (Harvey, 2009a)" and to develop a quality culture as a "self-critical a reflective community of practitioners" (Harvey, 2009a) and to link quality culture to the development of transformative learning (Harvey, 2009a).

Ehlers developed a conceptual model for quality culture in HE including four important elements: (a) structural elements embedded in the quality system of an organisation, (b) enabling factors which are factors enabling organisations to incorporate quality regimes into their culture, (c) quality culture elements, like symbols, rituals, values, which are often invisible and not necessarily uniform for the whole institution and (d) transversal elements which link different components to each other through communication and the encouragement of participation in order to foster and establish collective commitment (Ehlers, 2009, 2010). In this model, Ehlers includes earlier concepts such as "quality as a process of co-production between all stakeholders involved" (Ehlers, 2004, 2006) and the importance of *quality literacy* (Ehlers, 2007a, 2007b).

Berings advocates the quality culture definition of the Flemish Bologna expert team: "Quality culture is an organisational culture which contributes to the development of effective and efficient care for quality." (Berings, 2010) and developed a conceptual and dialectical model for quality culture, based on "three pairs of competing values or bipolarities" (Berings, Beerten, Hulpiau & Verhesschen, 2010): (a) innovation vs. tradition, (b) collective orientation vs. individual specialisation and (c) system control vs. self-determination, which lead to six

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culture images. On the basis of this model, he developed an instrument that can be useful for reflection on quality culture in HE institutions (Berings, 2009, 2010; Berings et al., 2010).

Some common elements can be identified:

- Quality culture is part of an overall organisational culture and is something every organisation has. In organisations, subcultures can exist, for instance in different departments of an institution.
- Quality culture cannot be imposed from the outside and is contextual. EUA reports that "context has been considered as particularly important" and states that "best ideas cannot always be imported into one's own institution" (Vettori, 2012). Harvey and Stensaker add "if we understand quality cultures as a matter of context, rather than a set of procedures, then the concept can be used as an analytic tool" (Harvey & Stensaker, 2008). Ehlers notices that especially the transversal elements communication, participation and collective commitment "cannot be totally externally steered and managed. Only the conditions for the creating of a quality culture can be management and communication, and participation can be encouraged to stimulate trust throughout the organisation" (Ehlers, 2009).
- Quality culture is related to shared values, beliefs and visions of all committed stakeholders.
  - Ehlers refers to quality culture as "a socially mediated and negotiated phenomenon" (Ehlers, 2009) and in his earlier work he defines quality as negotiated meaning (Ehlers, 2003).
  - EUA states that "effective strategies need to be meaningful by helping to make sense of what is going on, by integrating the meaning and the values that are already constructive for specific culture" (Vettori, 2012).
- All authors link quality culture to reflection.
  - According to Ehlers: "To analyse critically means the ability of differentiation and reflection." (Ehlers, 2007b, 2009) and quality competence is one of the enablers for quality culture.
  - Harvey and Stensaker argue that quality culture should be a tool for reflection (Harvey & Stensaker, 2008) and according to Harvey, "developing a quality culture is synonymous with developing a self-critical and reflective community of practitioners" (Harvey, 2009a). Berings developed an instrument to reflect on one's own quality culture (Berings, 2009, 2010; Berings et al., 2010).
  - The EUA states that "the best foundation for future enhancement may well be a reflection of the past and the present" (Vettori, 2012), but adds that this is a

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complex exercise because one has to be aware of the interplay between formal aspects and informal beliefs and assumptions (Vettori, 2012).

Self-assessment instruments

A considerable amount of literature exists on the use of benchmarking and self-assessment instruments as valuable tools for improving quality of online and blended learning programs and a wide variety of tools exists for assessing and monitoring quality of e-learning on an institutional level (Ossiannilsson, Williams, Camilleri & Brown, 2015). In Europe however, a tendency exist to apply benchmark approaches only for internal quality improvement and evaluation. Especially practitioners and teachers regard benchmarking with other institutions or against a standard as not useful, since they perceive too many differences in services and contextual environments. They seem to prefer self-reflective methodologies and processes (Shoesmith & Walker, 2011).

Different authors stress the importance of contextualized quality instruments and procedures according to the context and institutions' specific missions and objectives (Ehlers et al., 2006; Ossiannilsson et al., 2015), which is in line with the way of thinking about quality culture. Nevertheless almost all available tools are developed for higher education and universities, hardly any address the specific context of adult education (AE).

In the relevant literature, different guidelines, assessment and benchmark tools for open and distance education were investigated. The aim of this literature review was not to carry out a profound analysis and classification of all possible instruments, which was recently done by the International Council for Open and Distance Education (ICDE) (Ossiannilsson et al., 2015), but to screen instruments on their suitability for implementation in the context of adult education.

For that purpose, we defined a set of criteria:

- oriented towards OBL in AE or adaptable for this context (Ossiannilsson et al., 2015),
- focused on the institutional context,
- foster self-reflection (Ehlers, 2007; Ossiannilsson et al., 2015),
- aimed at continuous quality improvement (CQI) (Ehlers & Pawlowski, 2006a),
- learner centred (Ehlers, 2004; Ossiannilsson, 2012), and
- oriented towards different stakeholders (Ehlers & Pawlowski, 2006a, 2006b; Shoesmith & Walker, 2011).

On the basis of these criteria we selected the E-learning Maturity Model (eMM) (Marshall, 2010).

eMM is originally designed as a quality improvement framework which institutions can use to assess their capability to develop, deploy and support e-learning. eMM describes the e-learning capability of institutions in 35 processes, clustered in 5 process areas (learning, development, support, evaluation and organization) and assesses the capability of each

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process on 5 dimensions (delivery, planning, definition, management and optimization). Several concrete practices describe each process on each of these 5 dimensions and these practices are assessed on a scale: (a) not practiced/not adequate, (b) partially adequate, (c) largely adequate, (d) fully adequate, (e) not assessed. eMM explicitly addresses the institutional context and is supposed to support self-reflection of different stakeholders in the institution. Therefore, ICDE classifies eMM as an advisory framework (Ossiannilsson, et al., 2015). eMM pointedly focuses on CQI in the dimension *optimization*. The learner-centred approach is addressed in the process area "learning".

Due to its flexible structure based on process areas and dimensions, eMM can be easily applied in different contexts and institutions with different levels of institutional adoption and implementation of blended learning (Graham, Woodfield & Harrison, 2013).

eMM as a methodology to assess the quality of blended learning

The literature on quality culture has emphasised the importance of contextualisation, mediation and negotiation and the development of a self-critical and reflective community of practitioners with sufficient quality competences. In line with the findings of literature on quality culture, a new methodology is being developed to foster a culture of continuous quality improvement of existing and new blended learning programs in Flemish adult education on the basis of self-assessments with eMM. All centres engaged in the research are participating voluntarily, which is important to gain sufficient commitment.

In all participating centres, a preparatory meeting with the management of the centre took place in which eMM, the methodology and the assessment procedures were explained and the appropriate contexts were selected. The management of the centre made a selection of the staff members they wanted to be involved and selected the eMM processes to be assessed.

In the next phase self-assessment group sessions were conducted on the selected processes. Each assessor was invited to assess the processes in a self-critical and reflective way on all 5 dimensions of eMM: (delivery, planning, definition, management and optimization) and to support their assessment with evidence. Next, the individual assessments were discussed and the group of assessors had to agree on a final assessment.

The main goal of the group sessions is not to collect conclusive assessments on the different processes, but to foster a dialogue and to set up a communication on common beliefs, values and assumptions and to detect strengths and weaknesses, "since tackling specific problems and finding solutions for them is more likely to attract people's attention and stimulate their engagement" (European Centre for the Development of Vocational Training – CEDEFOP, 2015).

The reflection on the 5 dimensions of eMM can reveal whether an institution is tending towards ad hoc attempts or is mainly focused on procedures without implementation in daily practice or is capable of implementing processes in a full quality cycle and sustains the quality

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competence building of the assessors and is the building of capacity of the practitioners supported (Ehlers, 2009).

At the end of the self-assessment sessions, the participants developed a concrete improvement plan and follow-up-procedures.

The methodology is conceptualized to strengthen the enabling factors commitment, negotiation and quality competences of Ehlers' Model of Quality Culture (2009).

Future directions

The research aim is to further design, tweak and develop and implement the eMM self-assessment methodology in the context of blended learning in adult education centres. The model will be incorporated in a quality handbook for adult education and vocational education providers and will be further implemented in the implementation phase of the ALO! project.

eMM was developed for the context of higher education and universities and particularly address online education. Since no specific assessment tools were developed yet for the context of online and blended learning in adult education, the eMM will be adapted and contextualised to fit the needs of formal adult education.

The adapted eMM will be used for further self-assessments in adult education centres with different levels of institutional adoption and implementation of blended learning.

The expected outcome is a revised model for assessing the quality of online and blended learning for adult education and a supporting methodology for implementation.

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EVALUATING ONLINE PROGRAMS: ADAPTING THE COMMUNITY OF INQUIRY SURVEY

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Abstract

This paper describes the adaptation of the Community of Inquiry (CoI) survey to evaluate the quality of a cohort-based online graduate program in the United States. The academic activities in this program included both course work and research activities; and based on the CoI framework (Garrison, Anderson, & Archer 2000). The original CoI framework and its assessment were proposed for online *courses*; however, in this particular case an alternative assessment method was necessary. Hence, the CoI survey (Arbaugh et al., 2008) for online courses was adapted and used with the two cohorts of online students (*n* = 32) to measure the success of the community of inquiry design at the program level. The constructs cognitive, teaching, and social presence were thus extended for online programs, which resulted in an instrument to survey student perceptions of a CoI that encompasses asynchronous and synchronous interactions, as well as course-specific and non-course-specific interactions in different learning spaces.

Introduction

Several instruments exist to guide institutions in the assurance and measurement of quality. Higher educational institutions have a strong tradition of using teaching evaluations at the course level (El-Sayed & Burke, 2010). However, program evaluation, which focuses on the measurement of quality during the entire program through overall program goals rather than through the aggregation of single courses and their course outcomes, creates new challenges for academics and program administrators. Measurement of quality within online programs, in particular, online doctoral programs can be problematic. Hence, more instruments and new procedures are needed. This paper describes the adaptation of the Community of Inquiry (CoI) instrument for the purpose of evaluating an online doctoral program.

The online doctoral program in education (curriculum and instruction) offered at a large public university in the United States was begun in 2008. Theories of adult learning (Knowles, 1984) and the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000) guided the design of the cohort-based online program that enrols students who are working professionals in post-secondary, secondary, primary, non-profit, corporate and other educational environments (Kumar, 2014). Program leaders attempted to identify appropriate instruments in the literature for the evaluation of the online program, but existing instruments did not correspond to the design of the program or to its doctoral nature. Thus, a program-specific survey was created during the first offering and evaluation of the program with a focus on the CoI design and continuous improvement of the program (Kumar, Dawson, Black, Cavanaugh, & Sessums, 2011). The results of the survey and additional interview data made apparent that the CoI framework, proposed in online *courses*, would need to be expanded to describe the interactions in an online *program*. Following the publication of the validated CoI survey (Arbaugh et al., 2008) for online *courses*, this survey was adapted to encompass the different elements of the CoI framework in an online *program* and the specific learning environments used in this specific program. In this paper we describe the expanded CoI framework and the results of this survey with two groups of participants (n = 32) in the online doctoral program.

Conceptual Framework: The Community of Inquiry in an Online Program

The CoI framework Garrison, Anderson, and Archer (2000) is a leading conceptual framework comprising teaching presence, social presence and cognitive presence that guides design and research in online courses. The evaluation of the first offering of the online doctoral program that consisted of coursework and seminars followed by independent research with a research mentor (similarly to other US doctoral programs in social sciences) indicated that in an online program, these components can be expanded to faculty presence, social presence and cognitive presence. A brief overview of these three components based on the literature and our initial research is presented in this section.

Faculty Presence

Teaching presence is “the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison, & Archer, 2001; p.5). It includes instructional design and organization, the facilitation of interactions and discourse to increase learner knowledge and build understanding, provision of feedback and direct instruction by the instructor as a subject-matter expert in an online course (Anderson et al., 2001; Garrison, 2002). Multiple instructors teach in an online program, and although their teaching presence within individual courses is essential as defined by the CoI framework, *faculty* presence is needed for an online program to succeed. The planning and design of a sequence of courses that reflect a learning progression and build towards the program goals; the provision of instruction, feedback and different types of support for online students across courses, learning environments and other activities in an online program in the form of online advising, teaching and mentoring; continual communication amongst instructors and leadership about program-level issues that ensures consistent communication to students; and program leadership and administration that reflects the mission of a program combinedly contribute to *faculty* presence in an online program in additional to individual instructor presence in online courses (Kumar et al., 2011). In a doctoral program, students require guidance with research, writing, and professional development to integrate into professional organizations, conferences, and grant projects in their discipline. In the online doctoral program that is the

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subject of this study, students interact with multiple professors during their coursework, examinations, and dissertation research, although they have one research mentor.

Social Presence

In the CoI, social presence in online environments is defined as learners' portrayal of themselves as "real people" in the absence of face-to-face communication online (Garrison et al., 2000; p.89) and is considered essential for learning. Social presence was originally studied in discussion forums, but students in online courses or programs today interact with each other and with their instructors not only within course-specific online spaces such as discussion forums but also in social media and in virtual classrooms. Multiple forms of asynchronous (online discussions, Etherpad, Twitter) and synchronous (e.g. Google Hangout, Adobe Connect) media are used across courses and activities in online programs to help students stay connected with peers and faculty. Social presence in online *programs* is thus formed across multiple environments, both within and across online courses, in small groups that work on projects or have similar interests, in social networking sites (e.g. Facebook), and during practica, internships or other activities (Kumar, 2014). These interactions have to be considered when conceptualizing and measuring social presence in an online program. Moreover, while many of these are content, subject, or task-specific interactions (Remesal & Colomina, 2013) the building of social relationships in these environments is foundational to social presence (Swan, 2003) and to student completion of online programs. Students who feel connected to their peers, instructors and institution are more likely to complete an online course or program (Rovai, 2002).

In the online doctoral program studied here, students participated in asynchronous activities within courses and in a Google group, in monthly synchronous sessions with faculty and peers, and attended yearly 4-day meetings on campus. They interacted in these areas to share and discuss common goals, resources, academic and professional events, research, and their professional growth. The on-campus sessions and a Facebook group helped them build social relationships in addition to content-based interactions. It was thus important to address the different learning environments when evaluating social presence in the program. The cohort model and the building of initial social presence also contribute to peer support and student retention when students work on their dissertations. Interviews conducted after the first offering of the program revealed that students met with peers online, advised each other on research, provided feedback and motivation (Kumar, Johnson, & Hardemon, 2013).

Cognitive Presence

Cognitive presence is defined as the construction and application of knowledge through sustained reflection and online discourse (Garrison, Anderson & Archer, 2001) and is developed through the identification of a problem, the individual and collective exploration of the problem, subsequent integration or construction of meaning through exploration, and the application of that meaning to new contexts or resolution (Garrison, 2002). Cognitive presence is influenced by both social and instructor presence (Garrison et al., 2001; Garrison & Cleveland-Innes, 2005; Rovai, 2002), but the development of cognitive presence in *online*

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programs takes place in multiple virtual environments compared to *online courses*. Problem definition, exploration, and reflection are facilitated across courses, seminars, practica and other interactions in both asynchronous and synchronous settings. In an online doctoral program, students also interact with colleagues and experts in the field during professional conferences or on social media, in university-specific and non-university-specific and formal and informal learning environments, making it more difficult to define cognitive presence as an outcome of a specific set of interactions (Kumar & Ritzhaupt, 2014). In the case of the online doctoral program that is the subject of this study, students were encouraged to relate and integrate their doctoral studies into their professional environment, where problem definition, exploration and reflection was connected to a larger research topic and continued throughout the program, across modalities, courses, and learning environments. Cognitive presence was thus defined in the online doctoral program as the successful application of learning to a research problem, challenges in students' professional environments, and transformational learning as a result of participation in the online community of inquiry throughout the program (Kumar et al., 2011).

Program Design

The online doctoral program based on the CoI framework described above is structured as two years of required coursework and activities completed as a cohort, following which students take qualifying exams and work on their dissertations. These initial courses and activities (a) familiarize students with theory and research in educational technology as a discipline because students have diverse backgrounds, work in many educational environments and live in the US and abroad; and (b) facilitate the creation of conceptual frameworks and acquisition of research skills in smaller projects so that students can conduct independent research during the dissertation. All the core professors teaching in the program have doctoral degrees related to instructional or educational technology and at least 5 years of experience teaching online. Faculty, social, and cognitive presence are integral to all components of the program. *Online courses* foster faculty, social and cognitive presence through synchronous and asynchronous interactions, discourse, reflection, and group projects. Monthly *synchronous sessions* facilitate communication and faculty modelling of scholarly thinking about the discipline, research and professional events, while contributing to social and cognitive presence. *Inquiry groups* of 4-6 students share resources, have similar research interests and collaborate to support each other within the larger online community. These groups are initially assigned, but later student-created and student-led, although they have specific goals and activities at various times in the program. An on-campus orientation and two campus experiences over two years help build relationships among students and with faculty, develop cognitive presence, research agendas and program goals, and reinforce faculty and social presence. Finally, *asynchronous experiences* in a Google group foster faculty-student interaction and social and cognitive presence and a student-led Facebook group with no faculty presence assists in the building of social presence. Other additional media (e.g. Twitter, Google Hangouts) and interactions also occur in the online program, as described in the conceptual framework.

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Evaluation Methodology

In an attempt to evaluate the initial offering of the program, existing surveys in the literature were not representative of teaching and learning in an online *program.* A survey with an internal consistency reliability of .88 was created to reflect the expanded conceptual framework and assessed student perceptions (n = 16) on faculty presence (Faculty Instruction and Feedback, Cronbach's alpha = .90), social presence (Support, Learning Environments and Community-Building, Cronbach's alpha = .76) and cognitive presence (Application of Learning, Cronbach's alpha = .96) after the first year of the online program (Kumar et al., 2011). Faculty presence and cognitive presence was relatively high with a mean of 3.8 or 3.6 and above on all items (on a likert scale of 1-5). Asynchronous interactions outside required coursework had a low mean rating (2.56 and 3.00) compared to all other elements of social presence that were rated at a mean of 3.8 and above (Kumar et al., 2011). Open-ended feedback from students was used to redesign the program for the next offering.

The Community of Inquiry in the second and third offering of the program was evaluated using an adapted version of the CoI survey instrument developed by Arbaugh et al. (2008). The survey uses a 5-point Likert scale of strongly disagree to strongly agree. In general, the word *instructor* was changed to *faculty, participants* to *cohort*, *course* to *program*, and *course issues* or *content* to *educational technology*. For example, item#7 "The instructor helped to keep course participants engaged and participating in productive dialogue" was changed to "The faculty helped to keep the cohort engaged and participating in productive dialogue in Year 1," and item #25 "I felt motivated to explore content related questions" (Arbaugh et al., 2008; p.135) was changed to "I felt motivated to explore educational technology related questions." Items from the first program survey that was created and that encompassed the expanded framework were added to the CoI survey. For example, items about the perceived value of different media environments for community-building and student learning from the first survey were added, such as "I learned a lot from the on-campus orientation session." Likewise, items reflecting students' construction of knowledge through discourse or application of learning were added. The internal consistency reliability was Cronbach's alpha = .93 for faculty presence, Cronbach's alpha = .91 for social presence and Cronbach's alpha = .93 for cognitive presence (Kumar & Ritzhaupt, 2014). All students in two subsequent offerings of the program were invited to participate in the survey during their first year. All eighteen students in Group 1 and 14 of 22 students in Group 2 responded to the survey. Descriptive statistics were applied to analyze data from all 32 survey responses.

Results and Lessons Learned

The results of the survey in the two groups indicated strong faculty presence and cognitive presence. Social presence was found to be stronger in some areas over others. The complete results of the survey are not included here due to space constraints but will be shared during the presentation.

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Faculty Presence

The mean rating for all twelve items in the Faculty presence section of the scale was 4.2 and above for group 1 (n = 18), indicating a strong and cohesive presence of all instructors in the program. The items "the faculty encouraged the cohort to explore new concepts" and "the faculty provided feedback in a timely fashion" had the highest mean rating of 4.69 (SD = 0.49), followed closely by "I learned a lot from the faculty" (M = 4.62; SD = 0.62). In general, the results indicated that across courses and multiple learning environments, the instructors in the program had facilitated interactions and dialog, provided feedback that helped students understand and address their strengths and weaknesses, and guided students in their management of learning. In group two (n = 14), the items about feedback, although high on a scale of 1 to 5, had lower mean ratings than group 1. For example, the item "faculty provided feedback in a timely fashion" had a mean rating of 4.0 (SD = 1.11) as did the mean rating for the provision of feedback that helped students understand their strengths and weaknesses. Faculty provision of feedback was rated the lowest for the item "the faculty provided feedback that helped me address my strengths and weaknesses relative to the program's goals and objectives" (M = 3.79; SD = 0.97). All other areas had mean ratings of 4.14 and higher. The lower mean ratings for certain items of faculty presence in the program were explained by some students in the open-ended response box titled *Optional comments* for the faculty presence section. They specified the courses and curriculum activities in which their experiences had not been the same as others, which were found to be instructors who had not taught in the program earlier. The faculty presence scale was thus helpful in identifying that it is important to orient and educate instructors who are subject-matter experts in an online program about the overall goals and expectations of the entire program. This can ensure consistent quality of teaching, learning and communication in the program.

Social Presence

The survey contained 19 items for social presence that dealt with student's comfort level interacting in the different learning environments, their building of community and their learning in those environments. Students agreed that getting to know their peers gave them a sense of belonging in the program (group 1; M = 4.44; SD = 0.73 and group 2; M = 4.92; SD = 0.28), that they were comfortable participating in discussions (group 1; M = 4.44; SD = 0.62 9 and group 2; M = 4.92; SD = 0.28) and interacting with each other (group 1; M = 4.37; SD = 0.72 and group 2; M = 5.0; SD = 0), and that these discussions helped to develop a sense of collaboration (group 1; M = 4.38; SD = 0.62 and group 2; M = 4.77; SD = 0.44). For several items about the building of community in learning environments, the group 2 mean ratings were higher than group 1's mean ratings for this section of the survey. The asynchronous community space for group 1 was faculty-led and used mainly for providing information and asking questions. Students used this space to communicate with all the instructors about non-course-specific topics. They communicated with each other mainly in their Facebook group. The mean ratings revealed that the community space was less valuable for building community (M = 3.19; SD = 0.98) than the Facebook group (M = 4.5; SD = 0.97). Similarly, the on-campus meetings and small group interactions were valued by

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students for community-building. In group 2, the faculty-led community space was designed for increased student interaction, therefore the ratings were higher (M = 4.0; SD = 1.08). Similar to group 1, the Facebook group (M = 4.92; SD = 0.28) was valued highly for community building, as was the on-campus orientation (M = 4.85; SD = 0.38). In terms of learning, the on-campus meeting (group 1; M = 4.94; SD = 0.25 and group 2; M = 4.54; SD = 1.09) was rated highly by both groups as was the Facebook group (group 1; M = 4.37; SD = 1.03 and group 2; M = 4.69; SD = 0.48).

Cognitive presence

Student ratings on cognitive presence in both groups were high. The mean rating for all fourteen items in this section was 4.19 and above for group 1 ($n = 18$) and 4.46 and above for group 2 ($n = 14$). The item "Courses and program activities in year 1 have improved my understanding of research" was rated the highest by both group 1 (M = 4.69; SD = 0.60) and group 2 (M = 4.92; SD = 0.28). This was valuable feedback for program leaders because the larger goal of the program was the dissertation and independent research. The mean rating for "Year 1 of the doctoral program has contributed to my professional growth" was also high for both groups (group 1; M = 4.62; SD = 0.619 and group 2; M = 4.92; SD = 0.28). Student responses in both groups indicated that program activities and discussions had increased their interest and understanding of the discipline, they were motivated to explore further questions and research, and that the students were applying knowledge and skills gained during the first year in the program in their professional environment, with peers outside the program. The item "cohort discussions were valuable in helping me appreciate different perspectives" had a mean rating of 4.19 in group 1, which is a high rating in itself on a scale of 5, but was the lowest rated item in this section. During follow-up focus groups, students explained that initially they were more focused on the instructor's responses and perspective, and not on that of their peers, because they considered the instructor the expert in the subject-matter.

Conclusion

In this paper, we provided one example of how the CoI survey can be adapted to evaluate online programs. As indicated in the results of the survey with two groups in an online doctoral program, such a survey can provide insight into areas that are working across a program and areas that need improvement. When students are surveyed about their experience in a complete program – across learning environments, instructors, interactions with peers, and the kinds of activities and feedback they have had – the data collected reveals areas of weakness in the program that need to be addressed but also areas where the program is achieving its goals. Administrators and program leaders can use this data to improve their programs. In addition to collecting course-specific and institution-specific data about online learning, program-specific data is valuable in the evaluation of programs.

Additionally, this research expands on the constructs of teaching presence, cognitive presence and social presence in online courses for online doctoral programs. Cognitive presence was found to also encompass skills and competences that are meant to be developed in a doctoral program. This implies the inclusion and specification of survey items referring to research

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skills and discipline-related understandings that are relevant for the professional growth of this particular population. Further, the faculty-led and purposefully designed community-based instructional space had the aim to support interactions among doctoral students and faculty, and it did fulfil its purpose of information sharing; however, it was the student-facilitated Facebook group that succeeded in creating and maintaining robust social presence among the students through the entire length of the program. Social presence was thus experienced through social engagement in a social networking platform (Facebook) designed for that particular purpose – independently from the formal doctoral educational experience. Thus, in addition to instructional design and facilitation strategies for social presence, the nature of technologies used and their purpose can also influence the building of community in an online program. More research is needed on the relationships between faculty presence, social presence and cognitive presence across learning environments in online programs.

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IMPLEMENTING A MODEL AND PROCESSES FOR MAPPING DIGITAL LITERACY IN THE CURRICULUM (ONLINE BADGES)

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Introduction

Digital literacy has been identified as an essential part of a number of other skills and competences that should be developed and are collectively known as 21st Century Skills (The Partnership for 21st Century Learning, 2015; United Nations Education Scientific and Cultural Organisation, 2008). The increasing demand for the workforce to become digitally competent compels educational institutions to review their programmes and ensure that digital skills become embedded as a graduate attribute (Figel', 2007; Quality Assurance Agency, 2014). In the UK and at a national level, the ambition to enhance the digital capability of the workforce and the population in general has been articulated in numerous occasions by a variety of stakeholders. Examples within Higher Education include national initiatives such as the Developing Digital Literacies programme (Joint Information Systems Committee, 2013), the Digital Literacies in the Disciplines programme (Higher Education Academy, 2014) and the Changing the Learning Landscape programme (Higher Education Funding Council England, 2015) to name a few. The main drivers for enhancing the digital capabilities of a diverse student population have been identified as a requirement by employers as well as by professional bodies; the same issue was also reflected in the Government and funding council's strategies and policies (House of Lords – Select Committee on Digital Skills, 2015; Quality Assurance Agency, 2014).

A unique perspective was gained whilst working within a faculty and supporting their learning-technology developmental needs as a professional practitioner. The need for a new approach to academic professional development of digital capabilities was identified. It was observed that the established methods of delivering technology training to academic staff had limited impact in increasing their digital capabilities in practice. This was particularly noticeable when examining the application of newly acquired digital skills to teaching practices and curriculum delivery. The main reasons identified from, but also documented in literature, were: (a) lack of structured models for developing and employing new and innovative digital approaches to teaching (and learning), (b) resistance to change, (c) failure to utilise the opportunities of informal learning (and teaching) and (d) difficulties to capitalising the affordances of technology for formative assessment (European Commission, 2014; Johnson et al., 2013; Johnson, Adams-Becker, Estrada, & Freeman, 2015).

Establishing a Framework to Describe Digital Literacy

Having established the above as challenges that had to be addressed, it became apparent that an effective process and operational model was required for the development of digital literacies of staff and students. The first major concern in designing the model was to establish a common language to describe what constituted *digital literacy* within higher education. Digital literacy is understood as describing the competences, skills and attitudes of people using digital technologies (Ala-Mutka, 2011; Ferrari, 2012). These skills and attitudes are constantly evolving as technology changes and the individuals become more technologically capable or acquire new technologically-enabled interests. Digital literacy is a general term that signifies competency in using digital technologies but its meaning is wide-ranging and not specific enough without further classification.

In order to investigate what digital literacy signified to academics, academic professionals and students in healthcare education the digital-literacy attributes had to be defined. Establishing an appropriate framework was an essential requirement for two reasons: (a) the framework had to be validated by the main stakeholders against its appropriateness and suitability to describe digital literacy in health education and (b) digital literacy is a generic, high-level concept difficult to define without significant elaboration of the specifics of the context. For this reason, and before engaging the non-expert stakeholders in the exploratory validation case-study, it was important to establish a common frame of reference on what digital literacy was. This was achieved by creating a self-assessment questionnaire (Evangelinos & Holley, 2014b) based on the initial results of the DIGCOMP$_{v.0}$ framework (Janssen et al., 2013) which was used to baseline the digital literacy characteristics of the participants, and as a research instrument for conducting the semi-structured interviews to validate the framework. The questionnaire included the twelve high-level competencies identified in the framework which were further defined by five statements per classification area. A six-point, Likert-type agreement scale was used to enable the participants to self-assess by agreeing or disagreeing with each statement. The results showed the questionnaire could be used to baseline the general level of digital competence of individuals and groups and visualise their digital competence characteristics.

A case study on the applicability of the European Union DIGCOMP$_{v0}$ framework when used in embedding digital literacy into the healthcare curriculum found that it was applicable as a generic framework for professional practice (Evangelinos & Holley, 2014a). The interview data from academics, students and administrative professionals indicated that participants demonstrated highly individualised digital-competence characteristics and behaviours. The results of this study have been updated to reflect the published DIGCOMP$_{v1}$ version (Ferrari, 2013) in a later study (Evangelinos & Holley, 2015a). The DIGCOMP framework was chosen as it defined digital literacy granularly and described its multi-dimensional components in generic terms and sufficient detail illustrated by specific examples.

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The digital literacy self-assessment questionnaire was also updated to reflect the structure of the published version of the DIGCOMPv1 framework and utilise a new scenario-based approach to produce more accurate results. This updated questionnaire was used, alongside a survey of the student experience on using digital technologies, to assess the students' digital literacy when using tablet devices for the assessment of their clinical competences in practice (Evangelinos & Holley, 2016b). A staff-specific version of the questionnaire was developed along the same lines and was administered to academic staff merged with additional questions for the assessment of their professional digital practices; it aimed at investigating the potentials and limits of measuring the staff's digital capabilities.

Towards Embedding Digital Literacy in the Curriculum

The increasing digitisation of our society had a strong impact on the ways information is communicated in higher education. Students should develop their digital skills not only for the completion of their studies but also to become successful in their future career. Digital skills are acquired when engaging with digital technologies to carry out specific tasks. Evidence supports that digital capability is developed more efficiently when the digital skills are embedded in the curriculum (Leeds Metropolitan University, 2011; Thomson et al., 2014) and contextualised within a discipline.

Based on this principle a pragmatic approach utilised a model for developing digital literacy as a second-order learning outcome of technology-enhanced, activity-based learning designs. The concept of using a learning design to purposefully enhance the curriculum and deliver digital literacies has been explored as part of the Open University Learning Design Initiative (OULDI) project (Cross, Galley, Brasher, & Weller, 2012; Galley, 2011). Learning Design as a discipline is concerned with the development of a framework of educational notation that could be used to describe learning and teaching activities and facilitate the sharing of good practices among educational practitioners. As Dalziel et al (2013; p.1) explain in the opening page of the Larnaca Declaration on Learning Design aims "… to convey great teaching ideas among educators in order to improve student learning.' Learning Design is perceived as an abstract 'meta-model'" aiming to describe a variety of learning activities that could be based on different pedagogies and, in this light, it could be characterised as pedagogically neutral (Dalziel et al., 2013). The model was investigated by conducting two case studies that evaluated the student experience of undertaking technology-enhanced learning activities online (Evangelinos & Holley, 2015b) and when using mobile tablet devices in the classroom (Evangelinos & Holley, 2016a).

The first case study assessed the student experience of undertaking learning activities designed according to the classifications of the DIGCOMP$_{v0}$ framework to deliver parts of the curriculum content in a technologically-enabled way for the enhancement of their digital capabilities. The activities were delivered to the students by setting-up eight online study activities within a Virtual Learning Environment (VLE). The student experience was evaluated by asking the students to keep short, reflective diaries on the development of their digital capabilities when completing the activities. Students found the activities stimulating,

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meaningful and importantly useful for their learning. Reflecting on the results revealed that the model could be further improved by constructing the curriculum content and the digitally-enabled activities in a flexible way that would allow personalisation so as to maximise the learning gain for all students regardless of their starting competence point.

The second case study documented the experience of a group of student midwives undertaking a similar set of ten technologically-enabled learning activities in the classroom by utilisation of tablet devices. The digital component of the learning activities had been modelled according to the $\text{DIGCOMP}_{\text{v1}}$ framework taxonomy and the student experience was evaluated by issuing a short questionnaire. The results of this second case study reinforced the previous findings, with the majority of the participants reporting that they enjoyed working collaboratively, benefited from engaging in activity-based learning and felt that they possessed the required digital skills to complete the activities. However, a significant minority reported that they needed to further develop their skills in using digital technologies. In general, participants acknowledged that technology-enabled, activity-based learning has been beneficial for their personal and professional development.

Having explored the implications of this technology-enhanced, activity-based learning-design model on the student experience, a further need was identified: to devise a plan for the staged implementation of this approach. Curriculum re-development is a time consuming and complex process, difficult to justify without having unambiguously established the student benefits and fully developed the necessary quality assurance processes. For these reasons a small funded project investigated the potential and limits of acknowledging the digital literacy characteristics existing in the curriculum. The project was designed to pilot a process and related tools for issuing online *badges* in recognition of the digital capabilities that students acquired by experiencing and successfully completing the modules in their respective programmes of study. The project started in October 2015 and is due to end in July 2016. The modules shortlisted for the pilot were mapped against a set of bespoke digital-literacy attributes that constituted the necessary qualities to be obtained by the graduates. This digital badging meta-framework (Kerrigan & Evangelinos, 2016) drew from the EU Digital Competence $\text{DIGCOMP}_{\text{v1}}$ framework (Ferrari, 2013), the work by Hinrichsen and Coombs (2014) and the Jisc-funded project Digital Literacy in transition (Kerrigan, Coombs, Walker, & Hinrichsen, 2013). Specifically, course teams were asked to identify where elements of digital literacy were delivered within their curriculum. The mapping process was documented by utilisation of a digital-literacy, curriculum-mapping tool (Kerrigan & Evangelinos, 2015). The tool was used, at a holistic level, to visualise the digital-literacy attributes developed within the pilot modules. The details of how digital literacy was taught or assessed within each module were recorded as evidence and used to quality-assure the process of issuing the digital badges to the students.

During the implementation of this project, unintended, although not unforeseen, quality-assurance implications were identified. Walker and Kerrigan (2016) identify the correlation of the digital capabilities of students and academic staff required for the successful delivery of technology-enhanced curriculum in recent literature. As a result of their triangulation model

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a parallel need to quantify the digital-literacy complexity of learning designs that constitute the technology-enhanced curriculum emerged. The embedding of digital literacies in the curriculum raises questions on how to ensure that the technological-competence and learning-design complexity requirements could be aligned and optimised to serve a diverse student body, challenging the highly capable students while, at the same time, being inclusive for the less capable. These areas merit further investigation and development so as to establish tools for measuring the digital capabilities of students and tutors that will enable the optimisation of the curriculum.

Conclusion

The potential of the project concerning the enhancement of the student experience is multi-fold. Firstly the mapping of modules and courses will enhance the quality of the curriculum design ensuring that digital literacy is core to curriculum-design and delivery. It is envisaged that the process of identifying the digital-literacy attributes of modules and the issuing of badges to the students will reinforce the dialogue on how these graduate skills can be best delivered to students. This issue presents implications on how the institution supports the professional development of the academic personnel to ensure that they possess the technological-pedagogical knowledge (Koehler, Mishra, Akcaoglu, & Rosenberg, 2013) to deliver digital literacies within their curricula. The establishment of institutional quality-control processes will also ensure that students graduate with the digital skills required by their respective disciplines.

The issuing of digital badges can increase engagement (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2013; Farzan et al., 2008) and learner motivation (Denny, 2013) despite the fact that learners present varying behaviours in the acquisition of badges (Abramovich, Schunn, & Higashi, 2013). Badging could also encourage students to take control of their own learning and become proactive and independent learners (Jarman, 2005). Digital badges, if properly designed, can act as indicators of the digital skills and competences required within a discipline (Kriplean, Beschastnikh, & McDonald, 2008). Importantly, the students will be able to identify these attributes when seeking for employment or further training, while the utilisation of the online badges will be providing an overview of their achievements, easily accessible on the Internet. This will enhance their employability prospects as it will allow them to articulate and evidence their digital capabilities, as these will be identified and delivered by their course. The nurturing of digital skills and competences in relation to their discipline presents the potential of encouraging graduates to become digital innovators and leaders within their disciplines. The digital online badges – based on the bespoke digital-literacy framework – should formulate the conceptual basis, and allow students to identify the digital capabilities developed when undertaking the modules within their programme of studies. Students are expected to acquire the necessary language so as to be able to describe their digital capabilities when they graduate.

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Research on the student experience, conducted prior to the start of this project, indicated that although the majority of students evaluated the experience of undertaking digitally-enhanced learning activities as interesting, worthwhile and useful for their learning (Evangelinos & Holley, 2015b), a significant minority did not necessarily enjoy working collaboratively by completing technology-enhanced learning activities (Evangelinos & Holley, 2016b). For this reason, during any curriculum-development phase, attention should be given to appropriately diversifying the pedagogic/andragogic teaching approaches so as to create an inclusive environment whereby learners will be exposed to a variety of teaching methods that utilise technologies to facilitate learning and develop digital capabilities. It is important to recognise that the student population is diverse and exhibits a broad spectrum of digital capabilities, prior experiences and a variety of preferred approaches to learning. These features are intrinsic considerations in establishing a model and associated processes for embedding digital literacy in the curriculum by utilisation of technology-enhanced, activity-based learning designs. This project aims to evaluate the experience of students when awarded digital badges in recognition of the digital capabilities developed when undertaking the modules within their programmes of study. At the same time it brings together the findings of previous work in an attempt to explore the operationalisation implications of moving towards a curriculum-development model and associated quality-assurance processes needed for embedding digital literacies in the curriculum.

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INTERNATIONAL STUDENTS' BEHAVIOUR IN VIRTUAL COLLABORATIVE LEARNING ARRANGEMENTS

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Abstract

This paper presents a case study comparing the behaviour of students from different countries in a common Virtual Collaborative Learning course based on web analytics statistics. Using the open source web analytics engine Piwik (http://piwik.org), browsing behaviour of students from Germany and Jordan in a closed learning social network was tracked and analysed. The results show differences in students' browsing behaviour and usage preferences in terms of students' engagement and students' preferences. They provide implications for design adjustments of the Virtual Collaborative Learning arrangement to enhance the learning experience of students in both countries.

Introduction

Understanding students' behaviour is important for effective design and implementation of technology enhanced learning scenarios (McKenney, 2013). It helps course designers to enhance its didactical and organisational structure to increase students' engagement and the learning impact. In collaborative learning settings, where students' social interaction is crucial for successful group learning, facilitating communication and coordination conditions should be considered to allow effective knowledge building and exchange (Soller, 2001; Kapucu, Yuldashev, Demiroz, & Arslan, 2010; Kreijns, Kirschner, & Jochems, 2003).

In Computer Supported Collaborative Learning (CSCL) settings, Computer Mediated Communication (CMC) plays an important role in students' interaction. With the lack or absence of social cues like gestures, students can face communication and collaboration difficulties (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999). This is even more challenging in international courses with students from different countries and cultures, due to probable variations in learning styles, contexts, and usage behaviour (Olaniran, 2009).

Virtual Collaborative Learning (VCL) emphasises the virtual classroom's role to integrate students from different locations in a distributed, yet inclusive social learning environment using social software (Tawileh, Bukvova, & Schoop, 2013). In addition to CSCL benefits of increasing students' motivation and active participation, it facilitates learning as a situated, socially transmitted process, where students can get actively involved in the virtual collaborative learning community (Schoop, Bukvova, & Lieske, 2009). Comparing students' online behaviour in international Virtual Collaborative Learning environments helps course designers to adjust the learning arrangement and facilitate effective communication, coordination and collaboration.

This paper compares browsing behaviours of German and Jordanian students in a closed learning social network to identify differences that may affect their interaction in a common Virtual Collaborative Learning course. The next section described the study design. The result are then presented and discussed in the third section and the final section draws conclusions and recommendations for future research.

Study design

The course *Collaboration in the Virtual Classroom* is a regular master's module at the faculty for business and economics at the Technische Universität Dresden. It is offered as a Virtual Collaborative Learning arrangement where students from Germany collaborate with students from partner universities abroad. The course offered in summer term 2015 included eighteen business students (10 Female and 8 Male) from Germany and eight computer science students (4 Female and 4 Male) from Princess Sumaya University for Technology in Jordan. It was selected as a case study to investigate students' behaviour in the learning environment based on web analytics statistics tracked and analysed using piwik, the open source web analytics engine. Beside users' location, based on their IP address, no further personal data was forwarded from the social network to the analytics platform.

The students were divided into five interdisciplinary groups of 5-6 members and asked to register in the prepared closed learning social network. This was built using elgg (http://elgg.org), the open source social network engine and offered the central communication and collaboration platform for all teams. The project-based learning scenario required the students to virtually collaborate in the teams and solve a given problem addressing critical incidents of intercultural communication in business virtual collaboration. The anticipated learning objectives included enhancing students' media competence through using Web 2.0 applications, self-competence through effective contribution to the group's solution, professional competence through negotiating and presenting a common solution, and intercultural awareness through working out intercultural critical incidents with peers abroad.

The intensive virtual collaboration phase was started by a kick-off videoconference, lasted for four calendar weeks (20.04.2015 - 18.05.2015), and was finished by a final videoconference. Each group developed and recorded an executive presentation of its solution. One instructor led the course supported by two qualified e-tutors from Germany, who followed-up with the groups for organisational, collaboration and group dynamics questions. Students' activity on the platform was tracked with their permission using the web analytics tool. This could recognise 93.6% of all visits and 98.1% of all actions tracked during the virtual phase to be form Germany and Jordan. The recorded statistics were segmented and compared to identify variation in the browsing behaviour between students from Germany and Jordan. The results are presented and discussed in the following section.

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Results

The reason of analysing and comparing statistical browsing data in this case study is to understand how students from different countries use the provided learning environment and how probable variation in their use can be addressed in the course design to enhance students' Virtual Collaborative Learning experience. For this purpose, indicators of *students' engagement* and *students' preferences* were extracted from the web analytics platform.

Students' engagement

While it is frequently used to measure students' interaction with learning materials and tasks in a Learning Management System (LMS), students' engagement in this study represents interaction in the Virtual Collaborative Learning environment, which requires regular visits and frequent activity in the online community

Online presence

The first indicator of students' engagement in the Virtual Collaborative Learning course is the regular visit to the virtual classroom. The number of students' visits to social network during the virtual collaboration phase is comparable to number of their physical class attendance during a classical course. Figure 1 shows a comparison between the total visits registered from Germany and from Jordan and exposes a common trend between students from both countries over the course duration. The peaks on 27.04.2015, 04.05.2015, and 11.05.2015 identify the start of the three major tasks. A slight decrease in the number of visits from both countries can be observed as the course proceeds, which can indicate an increasing students' orientation in the platform, as they tend to perform directed rather than exploratory visits and accomplish their intention in fewer visits.

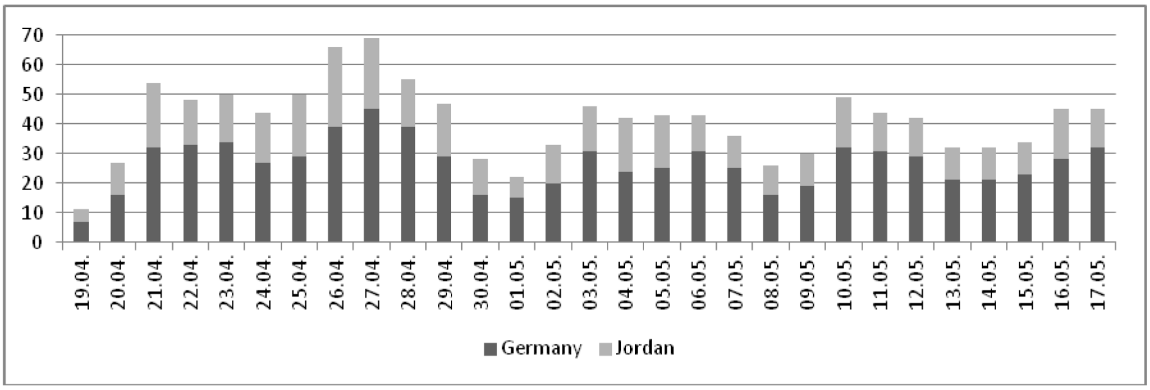

Figure 21. Absolute total number of visits over course duration

The displayed variation in the total number of visits corresponds to the different number of participants from each country. More representative investigation of visits' frequencies by location requires a relative metric, like number of visits per user. However, this was not available in the course due to anonymized tracking. To compensate the difference in number of participants, the number of visits from Jordan was multiplied by a correction factor of 2.625 (representing the proportion of German students). Figure 2 shows the normalized number of

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visits from both counties and illustrates a higher number of visits from Jordan all over the course duration.

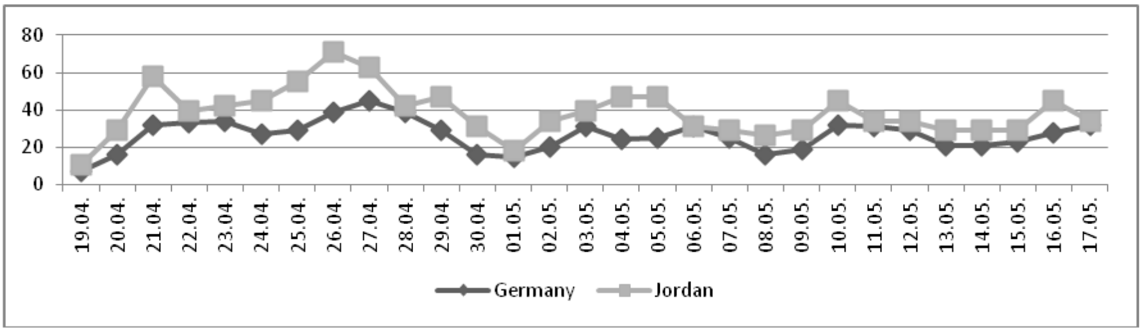

Figure 22. Normalized total number of visits over course duration

The high number of visits may reflect the interest of Jordanian students to "check-out" the platform frequently, while German students spent, in average a longer time on the platform during their visits as displayed in Figure 3.

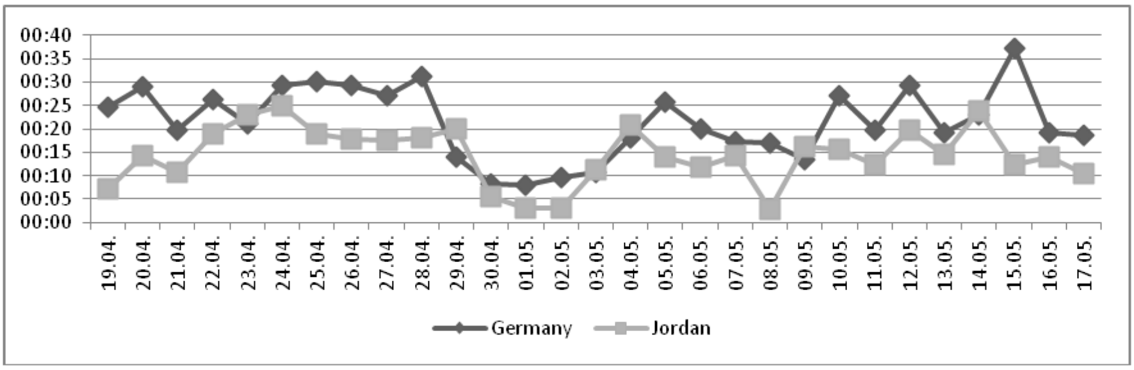

Figure 3. Average times per visit (in minutes) over course duration

Online activity

The quantitative web analytics data can provide an indicator of the presence quality in the number of users' actions during their online presence. While counting new visits to a website when users visit it for the first time or after a minimum of thirty minutes from a their last page view, piwik record more detailed statistics of users' activity during their visits as actions (page views, searches, downloads, etc.). Figure 3 compares the average number of actions conducted per visit from Germany and Jordan.

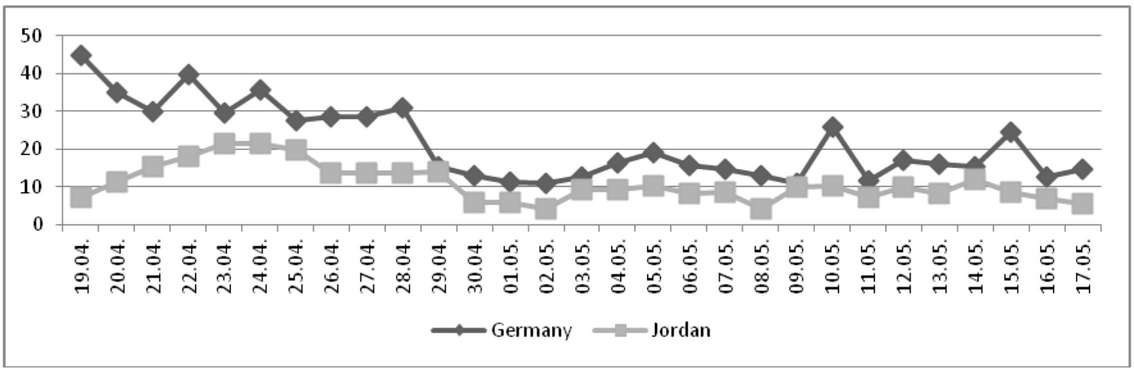

Figure 4. Average actions per visit over course duration

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It is clear that German students always conducted more actions during their visits than their Jordanian peers all over the course duration. In the first ten days of the course, activity from Germany promptly dropped to the much lower level of activity from Jordan. This may reflect a disappointment of German students by the inactivity of their peers from Jordan, which they faced by decreasing activity from their side. The overall trend of decreasing actions per visit from both countries supports the assumption, that students get better orientation over time and can accomplish their intention in fewer actions.

A useful indicator of students' interaction with course content can be observed in number of pages called during a visit. File downloads is another indicator of students' interaction with learning materials, that was not analysed separately in this study as the number of learning materials to downloads was very limited. The vast majority of course content (case study, tasks, readings…) was provided in an interactive format (blog, bookmarks, calendar appointments...). Furthermore, PDF documents were displayed in an integrated viewer. So a visit to the viewer page is considered equivalent to a file download. Figure 4 compares the number of pages called per visit. In more than a half of their visits, Jordanian students' viewed less than six pages (18% only one page view), while 47% of the visits from Germany called more than 10 pages per visit. These statistics support the assumption that Jordanian students frequently "checked-out" the platform and left after a short navigation, while German students interacted with course content more extensively.

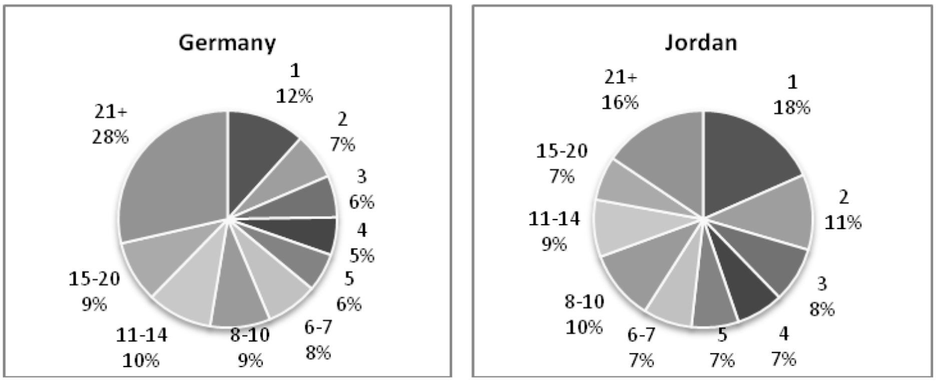

Figure 5. Page views per visit for the whole course duration

Students' preferences

Due to its strong dependence on Computer Mediated Communication (CMC), enhancing students' Virtual Collaborative Learning experience requires an understanding of their connectivity and browsing behaviour. This is important to consider individual and contextual factors in the international setting. In this case study, two aspects had to be considered when analysing students' behaviour on the platform: first, weekends differ between Germany (Saturday and Sunday) and Jordan (Friday and Saturday). Second, masters' study programs in Jordan are usually offered in the afternoon, as many students need to work in full-time to finance the high study costs.

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Time management

Figure 5 shows the number of visits from Germany and Jordan distributed on the days of the week. Despite the difference in working days and weekends, a common trend in the visits from both countries can be identified. The lowest number of visits was on Saturdays indicates fewer visitors to the platform on this common weekend day.

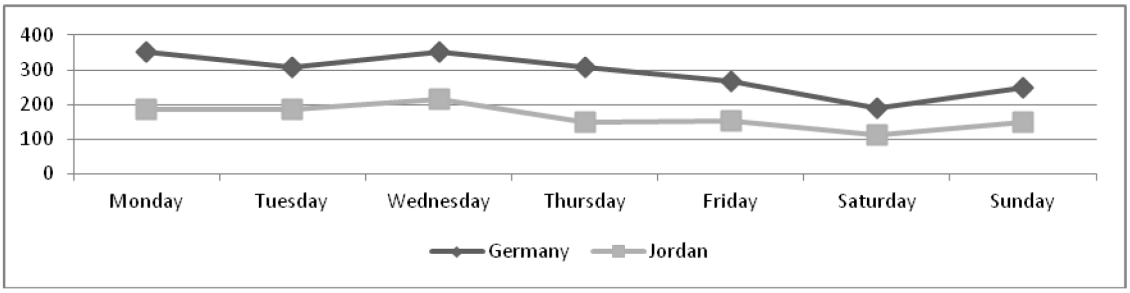

Figure 6. Total visits per day of the week

Figure 7 shows the normalized total number of actions performed from Germany and Jordan distributed on the seven days of the week. A trend of decreasing activity by the end of the week reflects a general students' preference to avoid intensive online participation on the weekend.

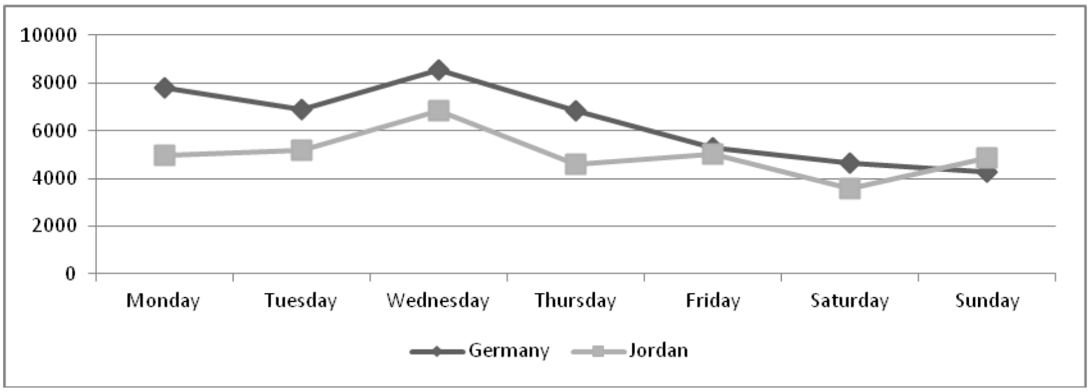

Figure 7. Normalized total actions per day of the week

Individual users' behaviour in a single visit displays an interesting trend, as the highest average number of actions conducted in one visit was on Saturdays for German students and on Fridays for Jordanian students as shown in Figure 8. This can be affected by the required long interaction at the first weekend (orientation) and the last one (the final solution). However, an almost equal distribution of actions' intensity over the days of the week can be noticed in both countries, which indicates constant effort during the visits, even on weekends.

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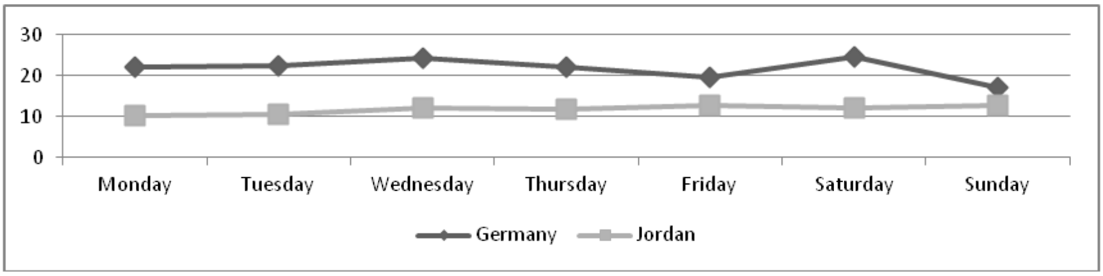

Figure 8. Average actions per visit per day of the week

Another students' preference that can be investigated using web analytics is the time they consider suitable for learning activities. Figure 9 compares the total number of visits from Germany and Jordan by local time. German students preformed 56% of their visits between 08:00 AM - 05:00 PM, while 49% of the total visits from Jordan were recorded in this timeframe. Jordanian students visited the platform after midnight till early morning (16% of total visits between 12:00 AM - 07:00 AM) more than their German peers (9%).

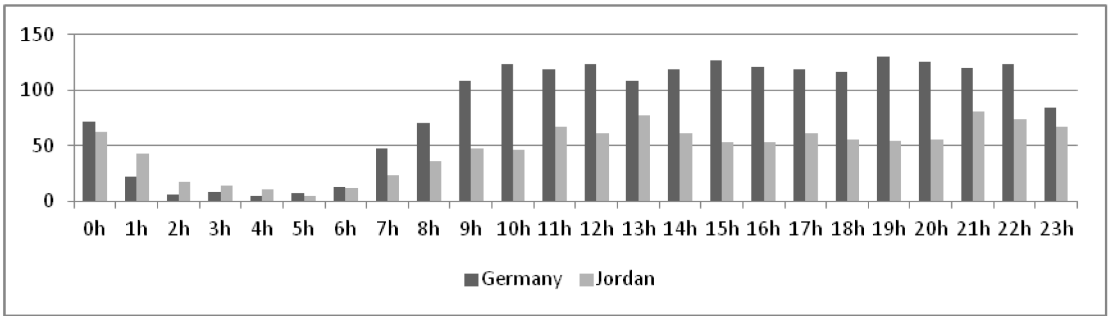

Figure 9. Total visits per local time

Figure 10 shows the normalized total number of actions conducted per time of the day and illustrates a high number of actions performed by Jordanian students between 09:00 PM – 01:00 AM (31.5%). While the highest number of actions performed by German students was at midday and between 08:00 PM - 10:00 PM. This conforms to the work situation of most Jordanian masters' students that require them to learn in the evening and at night.

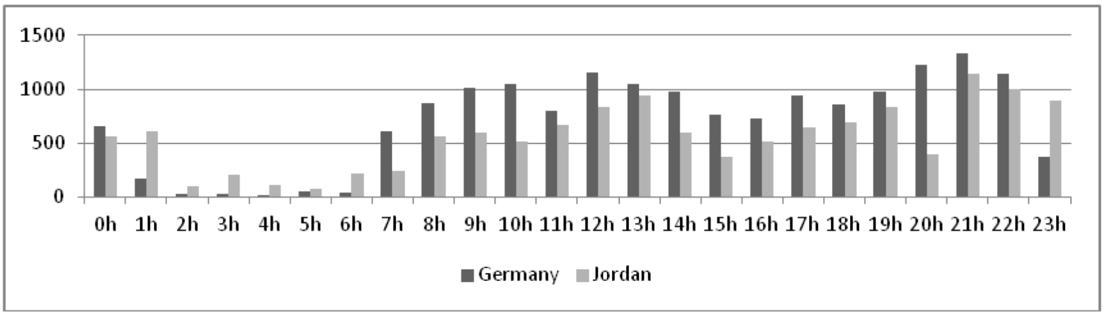

Figure 10. Normalized total actions per local time

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Technical devices

Information on technical devices used by the students help to enhance the technical platform for a better browsing experience. In this case study, students from Jordan visited the learning social network from mobile devices (mostly smartphones) much more frequently (40% of total visits from Jordan) than their German peers (27% of total visits from Germany). The number of actions performed from mobile devices was lower than the number of visits in both cases (24% from Jordan and 10% from Germany). In addition to this contrast, the high proportion of total time spent on the platform from desktop and laptop computers (90% in both cases) explains that Jordanian students mainly used mobile devices to check-out recent community activity in very frequent short visits as shown previously in "students' engagement" section.

Conclusions and future research

The aim of this case study was to understand and compare international students' behaviour in the social learning environment to enhance their Virtual Collaborative Learning experience. The results show a variation in students' online behaviour between Germany Jordan. While Jordanian students recorded more frequent short visits to the learning platform, German students spent more time in the social network during their visits and interacted more with the course content. However, the overall trend shows active participation from all students with daily visits and frequent actions even on weekends. It was also demonstrated, how web analytics can help collaborative course designers and instructors to follow groups' activity and consider enhancements in the learning arrangements. While the focus here was on the overall evaluation and comparison of students' behaviour from different countries, further studies should consider individual performance evaluation based on user profiled tracking to assess students' achievement and learning outcomes in a narrower sense of learning analytics.

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DIGITAL LEARNING IN HIGHER EDUCATION – "LESSONS FROM AMERICA"

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Introduction

The U.S. is the undisputed leader in digital (online and distance) higher education. 5.8 million students are taking at least one digital course, and some 2.7 million higher education students are studying exclusively via digital. Furthermore, growth in digital learning continues, even as higher education enrolments overall are declining (Allen et al., 2016; NCES, 2014; Ginder et al., 2015). What can European higher education institutions learn from this U.S. experience? In this research the author focuses on; the drivers of growth in digital learning, impact on learning outcomes, and institutional costs.

This research grew out of a 2014 academic sabbatical held in the U.S. In-depth face-to-face interviews were completed with 85 experts (institutional leaders, faculty, instructional designers-technologists, open educational resource experts, librarians, consultants, analytics experts and learning managers). Institutions represented included; 11 research universities, and 28 universities/community colleges (public, private, not-for-profit, and for-profit). In addition, educational consultancies and MOOC providers (Coursera) were involved. 35 video interviews were produced (plus transcripts) to complement the empirical research. That supplementary material was made freely available online (Online learning in Higher Education, n.d).

For the purpose of this paper, digital learning involves courses and programs offered as a normal part of higher educational institutions programs. Digital courses have at least 80% of their course content delivered online (Allen et al., 2016).

Digital enrolments in U.S. Higher Education

> *"Online learning is far more efficient and effective in allowing access. Furthermore, early participation in online learning and distance education predicts higher rates of degree attainment, even when self-selection bias is controlled for" P. Shea (SUNY, Albany).*

Digital higher education enrolments in the U.S. are growing faster than higher education enrolments as a whole. Digital enrolments account for 3/4 of the total growth in higher education, and 13% of all higher education students are exclusively enrolled in digital courses (see Table 1). The overall growth rate for digital enrolments is approaching +4% per annum

(Allen et al., 2016; NCES, 2014; Ginder et al., 2015). By comparison, traditional enrolments are declining, which may represent a challenge for the continued sustainability of some institutions (Cota et al., 2011).

Table 1: Higher Education Exclusive (100%) Digital Enrolments 2013

Category	Exclusive Enrolments	% Total Enrolments
Public	1,282,863	8.7%
Private (non-profit)	520,594	13.1%
Private (for-profit)	856,269	51.7%
Enrolments	*2,669228*	*13.1%*
Undergraduate	1,974,656	11.3%
Graduate	675,922	23.3%

(Allen et al., 2016; NCES, 2014). Online Report Card (2014) and Enrolment in Distance Education (2015)

Despite the impressive growth in digital enrolments however, many remain sceptical about comparative academic performance, retention rates, completion rates, and the overall quality of digital learning (learning outcomes). Furthermore, digital adoption barriers (primarily due to faculty resistance) remain a concern for institutional leadership (Allen et al., 2016). However, despite these concerns, many view digital modalities as a means to increase access to higher education, and to redress the prohibitively high cost of higher education.

Research themes

Multiple forces are at play within U.S. Higher Education (some of which are unique to that market). These forces have contributed significantly to the growth of digital learning. Therefore, a holistic empirical methodology was employed in this research, encompassing seven different contexts:

- Student Learning Outcomes, Institutional Policies (including costs), Teaching Experiences, Instructional Design/Technology, Open Educational Resources (OER), The Role of Libraries, and Competency Based Education.

For the purpose of this paper, the author will focus only on the primary drivers of growth in digital learning, the student learning outcomes, and finally institutional-level impact (costs).

Digital drivers of growth in U.S. Higher Education

Before reviewing the findings on learning outcomes, and institutional-level impact (costs), it is important to define the primary drivers which are impacting U.S. Higher Education, and contributing to the growth of digital learning (see Table 1). The author has determined that three dominant drivers are at play (demographic, economic and competitive). Furthermore, each of these primary drivers is exhibiting unfavourable sub-conditions. In fact, there are simultaneously three or more unfavourable sub-conditions occurring within each of the dominant drivers. The dominant drivers and sub-drivers are:

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- Demographic: Declining target-population + flattening graduation rates + stagnant immediate-transition-to-college rates (WICHE, 2013; U.S. Census Bureau, 2015; Kena et al., 2015). The traditional target-population (high school students) is declining in numbers. In addition, high school graduation rates have peaked. Furthermore, the Immediate-Transition-To-College rate is stagnant (+1%). Therefore, higher education institutions are struggling to achieve sustainable levels of growth (+3.5% annual enrolment rate according to McKinsey).
- Economic: Increasing tuition costs + rising student debt + decreasing public funding (Ma et al., 2015; SHEEO, 2015). Tuition and textbook cost increases have outpaced inflation for decades. Tuition inflation combined with sky rocketing student debt ($30,000 per student and $1.16 trillion +10%), along with decreasing public funding for higher education, have created fragile market conditions. Therefore, higher education has become prohibitively expensive for a broad range of the population.
- Competitive: Declining enrolments + new entrants + disruptive innovation (Allen et al., 2015). Enrolments are declining however; for-profit institutions continue to enter the market. In 2013-14 the for-profit sector awarded 16% of all associate, 7% of bachelor's, and 9% of graduate degrees (College Board, 2015). Furthermore, enabling technologies (digital plus other modalities) are disrupting legacy delivery mode.

Table 2: Drivers of U.S. Higher Education and Digital Learning

DEMOGRAPHIC	ECONOMIC	COMPETITIVE
Population Growth	*Costs*	*College Enrolments*
-1.0% for under 18's	Tuition/Textbook +3%	(declining)
Under 25's	*Student debt*	*Completion Rates*
60% of all students (saturated)	1.16 trillion (+10%)	(40% in four years & 60% in six years)
High School Graduation Rates	*Students Working*	*Under-served Markets*
(80% – saturated)	80% study & work	Adult, military etc.
College Transition Rate	*Public Edu. Funding*	*For-profit Institutions*
66% (+1%)	-50% in past 14 yrs.	8% enrolments 51% digital
Ageing Population	*Performance-based Funding*	*Disruptive Innovations*
Growth of over 65's	25 States have or plan	MOOCs, OER, Analytics

The above drivers have contributed significantly to growth in digital higher education enrolment rates, and are expected to do so in the near future.

Learning outcomes

Learning outcomes are a highly contentious topic within U.S. higher education (Jaggars & Xu, 2011; Jaggars, Edgecombe, & Stacey, 2013; Shea & Bidjerano, 2014; Lokken & Mullins, 2015). Up to recently, outcomes were primarily driven by a necessity to meet accreditation standards. However, a more substantive application of outcome assessments at the program and course levels is currently on the agenda within many institutions. However, there are numerous learning outcome criteria which can be deployed/measured (see Table 3), and those criteria

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are often institutional, program, and course-specific (Kuh et al., 2015; Kuh et al., 2014; Koedinger et al., 2012; van der Kleij, Feskens, & Eggen, 2015).

Table 3: Learning Outputs, Outcomes, Assessment and Validation

Learning Outputs	Learning Outcomes	Assessment	Validation
Access, Persistence, Retention Rates, Additional Enrolments, Time-to-Completion, Graduation Rates	Skills, Competencies, Abilities, Workplace Readiness, Employability	Evidence-based, Formative (low stakes), Summative (high stakes), Learning Objectives, e-Portfolios (artefacts), Pre and Post Assessments	Analytics, Benchmarking, National Testing, Faculty Focus Groups, Qualitative Criteria (faculty-driven)
Certifications, Student Feedback, Job Placements	Ownership of Learning	Self-grading, Learner-centred Assessment, Gamification, Adaptive Learning	Councils, External Experts
Teacher/student Ratios, Research Output	Satisfaction, Experiences	Define Optimum Student Profile (contextual), Engagement Levels, Problem-based, Enquiry-based	Information Systems, Analytics (time online, engagement etc.)
Cost, Tuition Increases/decreases, Broader Societal Impact	Opportunity Costs	Minimize Duplication, Forced Concept Inventory, Cognitive Tutor Authoring Tools, Critical Thinking Inventory	Separation of Teaching & Assessment, Knowledge-Learning-Instruction Framework (KLI)

The Lumina Foundation Degree Qualification Profile of standards for validation of learning outcomes was a framework being employed by many institutions interviewed in this research (Lumina Foundation, 2014). According to those guidelines, learning outcomes should distinguish between; generic, specific, basic, transferable and non-transferable skills (different kinds of knowledge and understanding), and should be specifiable in outcomes and available for objective assessment.

> *"Taking a careful design approach with a focus on improvement…can be a very powerful tool in the hands of instructors" N. Bier (Carnegie Mellon University)*

The use of assessment evidence is increasing within U.S. digital learning, although it is not pervasive (guiding institutional actions to improve student outcomes), and is currently driven by accreditation requirements (Kuh et al., 2015; Kuh et al., 2014). However, a more purposeful use of student learning outcomes in decision making has the potential to enhance academic quality and institutional effectiveness. This will require a shift from a culture of compliance to a culture of evidence-based decision making (policies and practices informed and evaluated by measurable impact on student learning and success. Despite these shortcomings, many of

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the output and outcome assessments for digital learning have been shown to be more favourable, with the exception of academic performance i.e. grades (Shea & Bidjerano, 2014).

Validation of learning outcomes

> *"Are the types of students who should take online courses different from students taking brick-and-mortar courses?" E. Bettinger (Stanford University)*

According to experts interviewed in this research, digital learning has received a disproportionate amount of scrutiny with regards to learning outcomes. As a result of this scrutiny, the subject of learning outcomes continues to be a research priority (Kuh et al., 2015; Kuh et al., 2014). However, rather than delving further into this highly contentious area, for the purpose of this research the author has focused on what might be the optimal instructional design framework (including assessments), which can best support the achievement of desired learning outcomes. Based on the extensive interviews made with faculty and instructional designers during the research, the following framework was constructed.

Proposed Instructional design framework

1. Define Outcomes: Establish learning objectives (student-centred), sub-skills (measureable, actionable, and 3rd. party verification).
2. Create Student Activities: The activities should support learning outcomes (active tasks, examples, assessments, feedback, help etc.).
3. Design Analytics: Measure interactions (low-stakes, high-stakes, aggregate, individual etc.).
4. Construct Learning Environment: A team effort involving; faculty, instructional designers, and instructional technologists.
5. Implement Analytics and Dashboard: A user-friendly and effective instructor tool to link performance with learning objectives (aggregate + subskills).
6. Provide Faculty Training: Peer-to-Peer consultation, Webinars, dashboard/technology orientation, and instructional design consulting.

More effort needs to be directed towards measuring quality of evidence. Furthermore, there is an increasing interest in defining more precisely; who is the optimum student that can benefit the most from digital learning? Comparisons of students in much of the current research have not accounted for (natural experiments and A/B experiments) the necessary variation (Kuh et al., 2015; Kuh et al., 2014).

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Institutional level impact (costs)

Throughout this research, the author raised the issue of costs saving attributed to digital learning. U.S. higher education costs per student have risen faster than inflation for decades. Average full time tuition was $9,410 in 2015-2016 (+2.9% on previous year before adjusting for inflation). Furthermore, digital learning is regarded as the best hope for cost-savings (Figure 1), based on the projected reduction in labour costs, scale economies due to larger class size and less face-to-face interaction (Lumina Foundation, 2014; Bakia et al., 2012; Deming et al., 2015; Hollands, 2011). However, during this research, costs data was hard to extract from the institutions interviewed, and in many cases there was an admission that costs are very hard to define. Furthermore, the impression was given that the reduction in costs was not the primary objective for those institutions pursuing digital learning initiatives (increasing revenue through enrolments, improving learning outcomes, and supporting the market attractiveness of institutions were cited more frequently).

However, research findings (Bakia et al., 2012) do suggest that institutions with more online students can charge lower prices (due to economies of scale, increased teacher/student ratios, productivity gains, elimination of duplication, increases in adjunct faculty etc.). For public sector institutions (the largest population of enrolled students), a 10 percent (1 standard deviation) increase in the share of students taking all courses in a digital mode, has been associated with a decline in prices of about 1.4 percent. Furthermore, 60% of Chief Academic Officers have indicated that the costs per degree for digital delivery modes are better that brick-and-mortar (Allen et al., 2016).

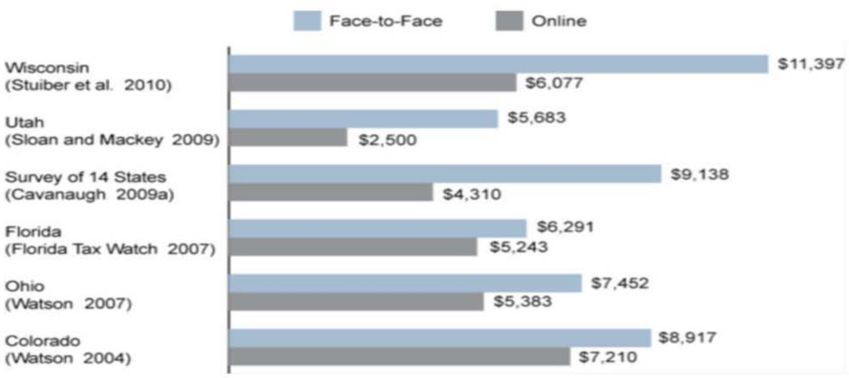

Figure 1. Cost Comparisons Face-to-Face vs. Online (Bakia et al., 2012), Implications of online learning for educational productivity

Conclusions and future research

Digital learning touches every dimension of the higher education, because it's about learning, and that's what universities, colleges and all higher education institutions do, they promote learning. One of the goals of digital learning for a long time has been to increase access to higher education. This is an important goal, which to a large extent has been realized. Furthermore, there are certain efficiencies which can be gained from employing digital learning (shortened time-to-degrees, students spending less money in doing so, and there are opportunity costs which are not lost). However, one should not neglect the aspect of personal

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enrichment and intellectual life which higher education can provide and the consequences in terms of unemployment, health outcomes and happiness outcomes that citizens may not otherwise have access to. As a result of higher education, students can begin to engage in the world of work, and begin to pay off loans that they've incurred. Those social and economic consequences can in the aggregate be profound.

Digital learning not only appears to increase the attainment of credentials but also increases the efficiency by which students attain those credentials. Therefore, students are attaining credentials earlier and faster if they are using digital learning. However, one of the major challenges is the availability of adequate data to support these arguments. Institutions could learn more about how digital learning is helping or hindering student outcomes if there were better data available. In addition, greater efforts should be made to specify how digital learning can enhance learning outcomes further for; specific types of institutions, programs, courses, and learners. There initiatives would also be of value because, digital learning provides the opportunity to personalize learning in a way that was not achievable earlier.

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EXPLORING ICT EDUCATION POLICIES AND TEACHING PRACTICES IN AUSTRALIAN AND VIETNAMESE HIGH SCHOOLS

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Abstract

This paper explores similarities and differences of teachers' views of quality policies and teaching practices in ICT education between Australian and Vietnamese secondary schools. Two secondary schools were selected (one from Yenbai province, Vietnam, and one from Sydney, New South Wales state, Australia) and, for this study, two principals and three ICT teachers were interviewed. Classroom teaching and assessment practices were observed, and principals and teachers' views about quality policies and teaching in ICT education were obtained through interviews and extensive discussions. In the final, we discuss some distortions and differences between realities and views and give some suggestions of improvement of ICT professional development and policies.

Introduction

Information and Communication Technology (ICT), as a subject, has been introduced in schools and transformed teaching and learning in order to provide innovative strategies to improve educational attainments (Anderson & McGreal, 2012; Kozma & Vota, 2014). Entering in the 21st century, teachers and students are requested to be prepared to achieve complex ICT skills in order to improve their learning capacity in resourceful ways (Kozma & Vota, 2014). In the context of growing amounts of information being achieved, transferred and transformed with increasing efficiency, educators around the world are increasingly concentrating on reshaping ICT policies and teaching more effective (Ubulom, Enyekit & Onuekwa, 2011). In this sense, ICT is a subject common to the curricula of many countries such as Australia and Vietnam, but with quite different implementations and rules within various ICT educational contexts (Kozma, 2011). In Yenbai School, for the ICT curriculum, immovable curriculum and textbooks were implemented by the Vietnamese Ministry of Education and Training (VMOET, 2006) decision from 2007 to now. Yet, no feedback or updates ever followed up. By contrast, for the Sydney School, the implementation of the Digital Education Revolution (DER), an educational project designed to build an adequate digital infrastructure for all primary and secondary schools across the country, was generally positively implemented (Australian Government, 2013) and every year the ICT policies, infrastructure and curriculum are attempted to be evaluated and updated by the Board of Studies Teaching and Educational Standards (BOSTES), the New South Wales state educational organization for teacher professional development and accreditation.

The goal for this study is to compare and explore quality policies and teaching practices of ICT as a school subject in senior secondary education in these two countries. This research reports a comparative case study exploring the views about the quality teaching of ICT in one secondary school in New South Wales, Australia, and one secondary school in Yenbai Province, Vietnam. The study is based primarily on the teachers' understanding and opinions of quality policies and teaching in ICT education and their perceptions of quality teaching of this curriculum. The findings of this study are applied to views on ICT teacher professional development, ICT teaching, policy and assessment practices in the two countries at the senior secondary school level.

This research outlines the results of two case studies based on a comparison of ICT policies and teaching in the two secondary schools from Vietnam and Australian. The study investigates similarities and differences in the way the principals and the ICT teachers view of quality of ICT policies and teaching between the two schools and cautiously compares and questions these views in the two countries. In this context, a comparative case study of the ICT education in Australia and Vietnam will address the following research questions: What are the current ICT teaching views about quality ICT policies and teaching in New South Wales and Yenbai secondary schools? What are the dissimilarities between these views and realities? From this comparative research on the theory and the practice of quality ICT policies and teaching in Sydney School and Yenbai School, solutions are proposed to improve the quality of ICT teaching in senior secondary schools in both Australia and Vietnam.

A Theoretical Framework in ICT Policies and Teaching in Australia and Vietnam

The new generations that has grown up with ICT has developed intuitive means of absorbing and exploiting the capacities that ICT offers, sometimes to the bewilderment of the older generation (Anderson & McGreal, 2012; Okolocha & Nwadiani 2015; Scardamalia & Bereiter, 2014). Therefore, ICT teachers need to have enthusiasm about ICT subjects to empower their students and teach them relevant content and skills. They need a high level of confidence and expertise, both in terms of their specialist knowledge and practical skills and their understanding of effective learning in the subject (Ubulom, Enyekit & Onuekwa, 2011). ICT teachers experienced huge challenges because ICT was a new learning area with content permanently updated (Potgieter, 2004), in which the teachers are neither formal trained to master the specific ICT knowledge, nor trained pedagogical strategies (Ankiewicz, 2003; Engelbrecht, Ankiewicz & De Swardt, 2007). As such, they are not sure of what the curriculum, administration and community expect of them.

Recent research studies in comparative education are increasingly making aware the need to examine instructional practices in the classroom in order to improve ICT policies, teaching, and learning. The Second Information Technology in Education Study program (SITES) shows that as is globally accepted, the computer in ICT education enters the classroom in order to enhance the quality and effectiveness of so-called traditional teaching promote students' motivation in learning and provide people with computer skills to carry out

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productive learning (SITES-Module 1, 1999; UNESCO, 2008). However, the research found that ICT lessons always remain challenging, as teachers and students uncreatively use software and ICT devices, so that ICT is rarely used for obtaining relevant information in instruction (UNESCO, 2008).

The following aspects were viewed by the New South Wales Department of Education and Communities (2010) gives three major aims for its ICT strategy plan: (a) Provide an innovative, agile and cost effective information technology service that enables and enhances the delivery of quality education; (b) Promote, develop and provide the ICT environment and initiatives that facilitate, foster and improve teaching and learning to meet individual student needs; and (c) Develop and ensure the assignment of appropriate inputs, decision rights and accountabilities to ensure appropriate investment in ICT and encourage desirable behaviour in its use. Unfortunately, there were no documents available in Vietnam for ICT education. This might be explained by the current practices that specify certain deadlines without trying to be accountable and show concrete approaches. As such, it is important to discuss views about good ICT policies and teaching and compare with current practices.

Methodology

This research is a qualitative research based on two case studies. Two high schools (one from Australia and one from Vietnam) were selected for case studies. One high school in Australia was chosen from New South Wales and one high school in Vietnam was chosen from the Yenbai metropolitan region. The selection of the two schools for the study was based on access, location and background of the researcher, and a unique relationship and comparability between the two cities. The schools were chosen to illuminate particular differences and similarities between educational settings relevant for exploring the quality of ICT teaching. Sydney School was selected as a large metropolitan school in Sydney in New South Wales. Yenbai School was similar to Sydney School in Yenbai Province in Vietnam. The data collection was from classroom observations, interviews and ICT curriculum and policies documents. Views of ICT policies and teaching at the Sydney School are presented first, summarized from observational data records of ICT lessons for two different areas (software and hardware curriculum sections). Classroom observations were followed by a detailed interview regarding the ICT lessons, to represent the general approach adopted at Sydney School. A similar approach was done in Yenbai school, were classroom observations and interviews were done with the principal and two ICT teachers.

The Sydney School Case Study

Sydney School was founded in 1885, and now is fully coeducational with classes from Kindergarten to Year 12. The parents and community acknowledge the school’s high standards of education. The Sydney School report (2012) stressed the role of ICT in learning. The principal of the Sydney School emphasized the role of ICT for each teacher and student: “Using ICT will develop each student’s feeling of self-worth, the importance of good communication, fostering a love of learning, an appreciation of cultural diversity and a desire to respect and help others” (Principal, interview, April 20, 2014).

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Short Description of the Principal and the ICT teacher

George (the pseudonym of the Sydney School principal) has a record of over 10 years' experience as a teacher and has a Master of Education degree. He noticed the importance of ICT teaching and learning in an increasingly connected world where students will move into technology-rich workplaces. The principal intends that, in his school, learning and teaching with technology could happen anytime, anywhere. This statement suggests that outcomes-based education plays a key role in teaching and learning practices at Sydney School. The principal also indicated that the school policy aims to develop students as outstanding citizens through its commitment to excellence in a safe and caring environment. Sydney School shows that technology is an important part of the school learning experience. From Kindergarten to Year 12, teachers are continuously finding new ways to integrate the latest and most age-appropriate technologies into their classrooms, in a way that complements and builds upon the school curriculum. Moreover, in the Sydney School, the principal said the teachers are encouraged to share innovative technology practices.

John (the pseudonym of the Sydney School ICT teacher) has taught at the School for more than 10 years. His ICT secondary school teaching preparation was obtained through in-service training. John understand when and how to use technology for quality learning. John had to learn a great deal of ICT during his in-service courses. Apart from the main element of computer programming, he studied database design; curriculum assessment, graphics, and information systems. With changes to the curriculum, he took further training at university or at school. When interviewed for this research, John indicated that he taught ICT to classes to Years 9, 10, 11 and 12, with class sizes between 16 and 30 students. In accordance with BOSTES (2012) requirements, the teaching of ICT subjects in Sydney School is as follows: Year 10, Information Software and Technologies; Years 11 and 12, Software Design and Development. Different from other subjects, ICT was taught in a computer room exclusively designated for this purpose. The computer room/classroom was a learning space decorated with colourful pictures on the walls, along with timetables and classroom rules. There were 27 computers arranged in two rows connected to the internet.

Beliefs about the Quality of ICT Education

The Principal perceived the role of the ICT education as providing a practical and efficient way to improve their learning and day-to-day practices. He believed that good ICT education required teachers to have a comprehensive vision for the future of learning with ICT. Specifically, when students studied using the internet, Sydney School wanted them to be able to access relevant online information, to disseminate and evaluate its relevance, and use it in innovative ways. As far as social and ethical issues in handling technology were concerned, the School aimed to have students conduct themselves with integrity and respect in dealing with other learners and indeed with experts in the field that they might encounter. As well, ethical aspects of the use of ICT were explicitly made by the principal. In principal's view, a particularly significant learning strategy relates to the use of the iPad, even it was quite challenging at the beginning. On a daily basis, all students from Year 5 to Year 12 are required to bring a 32 GB iPad to school. These iPads have by no means simply a symbolic use.

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Students, considers George, need to be taught how to present and publish their ideas from all key learning areas in a variety of formats. They must be able to manage their own learning, using their personal device and online tools and resources. They are expected to be able to safely publish and present their ideas and learning online in a way that highlights their skills and abilities, while respecting copyright and acknowledging sources. These were the reasons why these Apple devices were introduced and heavily used in the school. As well, new devices and software packages were introduced. For instance, George indicated that, recently, the school had introduced Schoology, a cloud-based learning management system, a configurable social network software for educational and social bookmarking software called Diigo, and several Google educational applications that students can use at school.

George emphasized the need for school investment in building a sound ICT infrastructure, linking hardware, networking, software maintenance, upgrading, and documentation. The school has engaged a technology team in order to maintain an adequate ICT infrastructure. The school has surveyed teachers and students every semester in order to obtain feedback about ICT issues. Moreover, Sydney School has established policies and procedures that are developed continuously and used consistently. In addition, teachers and students are surveyed every semester about infrastructure at the school. The principal believed that the school should make use of the new technology-enabled avenues for learning. For this purpose, he set four objectives for student learning: (a) Extended emphasis on Internet use to a K-12 Digital Literacy Scope and Sequence, as a vast learning resource that would map skill development throughout the period of pre-university schooling; (b) Students need to remain permanently engaged in an increasingly connected technology-rich world, as ICT will play an important part for obtaining employment in the future; (c) Students need to know how to present their skills and abilities, through the school's digital-citizenship programs and policies, in order to become employable, and (d) Students need to develop digital competency, including the use of personal devices and online tools and resources, as a crucial element of higher education and the work situation that will follow.

George wanted teachers to improve in their ability to know when and how to use technology for quality, learning, teaching and efficient administration. He believed that every teacher was at a different place in their ability to know when and how to use ICT. For success to occur, the school would need to provide adequate support for each teacher, in order to help her or him learn and grow. In addition to this, the principal considered that the amount of time devoted to technology focused on professional learning needed to be substantially increased. He wanted effective and innovative practices to be shared within the school among all teachers. Furthermore, he wanted these ideas to be shared widely and freely with colleagues in other schools as well. John confirmed the continuing effort to improve ICT in teaching and learning. He discussed aspects of collecting feedback from teachers and staff, in order to improve the use of ICT in teaching and learning:

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> *I'm always trying to improve the way I do things. I gather feedback from students at the end of a unit. I assess my own teaching and I assess the work students have completed and the level of expertise they have developed. (John, interview, Apr. 5, 2014).*

The Case Study of Yenbai High School, Vietnam

Yenbai School, established in 1957, is one of the largest public high schools in Yenbai Province. The Yenbai School curriculum contains 13 subjects, one of them being Computer Education. In line with the general practice where high schools decide on the number and content of streams on the basis of student preference and prevailing school circumstances, the Principal of the Yenbai School, called in this study as Mr. Khoa, explained that Yenbai School offered the Basic Strand with 19 classes, and the Natural Sciences Strand with 12 classes (Natural Sciences is an academic program requesting more advanced classes and a higher number of hours than the Basic Strand). With all Vietnamese high schools, students studied only one ICT subject in both strands, a major difference from the New South Wales senior secondary curriculum. As well as, the principal explained that "for all teachers, teaching and assessment must strictly accord with the requirements of the syllabus and textbook content" (Khoa, interview, Apr. 14, 2013). Mr. Khoa acknowledges the immense role that teacher play for this school: "the teachers' knowledge and conduct play an important role in the school's quality of teaching and learning and the reputation of the school" (Khoa, interview, Apr. 14, 2013).

Short Description of the Principal and the ICT teachers

Khoa spent over 20 years teaching mathematics and 10 other years in educational management. After eight years, as Deputy Principal at two different high schools, he was appointed Principal of Yenbai School in 2011. Principal Khoa commented about ICT education at Yenbai School, saying that ICT teachers must be professionally competent, dedicated to students, and fair. The ICT teachers were also expected to involve themselves in guiding students to achieve practical results. Principal Khoa saw the rationale for upgrading ICT teachers skills in Yenbai School in terms of effective deployment of the education workforce, enhancing management expertise in the educational field, and evaluating principal and teacher professional standards according to VMOET (2006).

Ha and Nga, male and respectively female ICT teachers, were teaching ICT at the Yenbai School for more than ten years. Ha had 18 years of experience in teaching and initially, he was a secondary mathematics teacher. Ha had graduated from the Ho Chi Minh City Pedagogical University in mathematics (a four-year course) in 1992, and from 1995 to 1996 studied ICT at Ho Chi Minh City Polytechnic University. To improve ICT teaching and learning, Ha has joined VMOET mandatory week of in-service training formed part of Ha's 2004, 2005 and 2006 VMOET major ICT Teacher Certificates, his 2007-2008 Practical Training Certificate, and 2012 Professional High School Certificate. In this school year, Ha taught ICT to one class of Year 11 students and five classes of Year 12. Nga had 15 years since she started teaching and was from the beginning an ICT educator. Nga graduated from the University of Natural

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Sciences in 1999, and received in-service training in ICT. She has been teaching ICT at Yenbai School since 2004. Nga for her part had a 2005 Hanoi National Education University Educational Research Institute Practical Training Certificate and a 2007-2008 Practical Training Certificate. In this school year, Nga taught 11 different ICT classes in semester one (three Year 10 classes, three Year 11, and five Year 12). In semester two, she taught eight different classes (three Year 11 and five Year 12 classes). Each of them taught in large classes comprised of 38- 48 students; a class period lasted 45 minutes.

Beliefs about the Quality of ICT Education

Principal Khoa saw the rationale for upgrading teacher skills in Yenbai School in terms of effective deployment of the education workforce, enhancing management expertise in the educational field, and evaluating principal and teacher professional standards according to VMOET (2006). Yet, Yenbai School does not have yet a detailed strategy to improve the quality of teaching and learning that complies with either the Ministry of Education or the Provincial Department of Education and Training another point of difference from Sydney School. While the Sydney School principal, George, emphasized the importance of sharing the ICT knowledge and innovations, Khoa explicit approached sharing the knowledge.

The Principal of Yenbai gave a pragmatic view of the ICT education. In his view, technology needs to be involved in various learning areas such as scientific inquiry and social sciences. It involved meaningful use of standard applications and covering general issues such as processing information, file structure and folders, as well as knowledge about operating systems. Computer operations relate to industry and to life in general, and informatics generally requires general manipulative skills rather than specialized knowledge. It follows that ICT policies and teaching require a high degree of flexible thinking from teachers. An ICT concept can have various definitions and various interpretations. Teachers need to focus on what student assignments teach about software knowledge and user skills, as well as their application to other school subjects, and ultimately the use of informatics after graduation. In this way, ICT as a subject contributes to a high-level intellectual reasoning and accurate, critical and disciplined work habits. As he explained:

> *In our school, each teacher has a syllabus and a textbook for the ICT subject, and is required to follow these. For all teachers, teaching and assessment must strictly accord with the requirements of the syllabus and textbook content (Khoa, interview, Apr. 14, 2013).*

The principal offered many suggestions about improving the quality of ICT teaching and learning. Khoa suggested that teachers needed to improve their ICT teaching by taking four major steps: (a) understanding the purpose of the ICT subject; (b) identifying the content of ICT subject; (c) improving the organization of the classroom and computer lab, and (d) improving evaluation and testing skills. The two teachers from the Yenbai School identified individual study and classroom observation as the two main approaches to in-service professional development at Yenbai. Both referred to their individual online individual study

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work. Interviews showed that the two teachers emphasized the need for careful lesson design with clear objectives and planned activities. From the above content requirements, the researcher found that Ha and Nga gave their thoughts regarding the subject of ICT, learning and working with educational facilities, appropriate use of common software, exploitation of information using the Internet, understanding how to program, and knowing basic Pascal programming language. It was noticed that the teachers did not frequently check the students' level of understanding. While both teachers realistically acknowledged that the great majority of students did not understand programming concepts, they did not slowed down their pace and did not give easier programs. At the end of class observation, they reckoned that only three students from a class of over 40 in total adequately understood the programming exercises in the Pascal language. Nga, for instance, noticed that her students needed more time to practice on computers.

While the principal had a very pragmatic view on ICT students, both Ha and Nga emphasized the importance of mastering software programming, in order to become future ICT professionals. For them, if students have a high level of knowledge in programming, it was highly probably to work in an ICT field in fancy uptown jobs. Therefore, they saw their mission as providing as many as possible future ICT specialists. Similar to the principal Khoa, both ICT teachers were not involved in exchanging new information with other teachers. Classroom observations made it clear that teaching and learning practices at Yenbai School were heavily influenced by the textbooks' content. Assessments and lessons were found to be highly structured and followed a rigid sequence. The two teachers interviewed indicated that they were required to follow the requirements of the syllabus and that teaching and assessing were based on the content of textbooks reflecting the syllabus. As such, at times, there was a great difference between what they felt was good teaching and what the current practices requested. In the final section of this paper, we will discuss contradictions between the views and practices of quality ICT policies and teaching.

Final Discussions

In this concluding section, we will outline differences between their views of good ICT policies and teaching, describe some contradictions between views and practices, and provide some recommendations. A case study of each of two representative schools, Sydney School and Yenbai School, has been carried out through observation, interviews, and document analysis. Representation in both cases needs to be seen in terms of validity and generalizability. Although qualitative research methods might be perceived as difficult when one tries to generalize the results collected from the two case studies from the two countries, this research asserts that qualitative methods are vital to be deployed to study the complex aspects of different national educational systems such as Australia and Vietnam.

Overall, the teachers and principals unanimously had a positive attitude towards the increasing role of ICT in education. However, it is worth noting at this point numerous differences that need to be cautiously analyzed in order to avoid making simplistic or stereotypical generalizations. It is important to emphasize the differences between sharing

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ideas among ICT teachers. While in the Sydney School, both principal and teacher were freely exchanging and encouraging other people to share ICT learning materials, the Yenbai School principal and teachers did not have any effort of sharing and exchanging ICT teaching experiences. It might be that Vietnamese teachers were more secretive with their own ICT curriculum materials, as these resources were very rare and difficult to obtain. As well it might be the competitive attitudes prevented them to exchange the ICT education information with their peers. In contrast, there were too many learning items online in Australia, so that the ICT teacher was freely exchanging them in order to adapt to the new curriculum updates and improve students' knowledge.

At the Sydney School, John explained his constant efforts of adapt his techniques to student learning needs and use these to improve his ICT pedagogical strategies and skills. He considered assessment as relating mainly to the teacher's sense of professional responsibility in educating students, rather than focusing on the students' efforts or parental factors. The teacher should teach comprehensively and well. It was noticed that, at the Yenbai School, it was to push students to achieve better academic results. At the Yenbai School, although both teachers interviewed recognized the importance of assessment in their teaching, they saw the main purpose of assessment as being to check students' ICT learning in order to stimulate student motivation to improve achievement levels. This relates to the Vietnamese tradition where teachers attribute achievement to students' motivation and where parents deeply respect and support teachers. As an extension of this notion, the two Yenbai School teachers mentioned that local education department administrators considered student achievement as the most important indicator of teaching accountability. However, it was not seen any local or provincial approach of handling the results of assessments. In a different path, at the Sydney School, the focus of assessment was to improve teaching practices.

Most information available to them on student learning was derived from classroom observation and homework. Major factors hindering them from trying out new methods of ICT assessment recommended by the new syllabus, in their view, were lack of resources and inadequate professional training opportunities. The interview data suggested that teachers in both Australian and Vietnamese high schools do not have sufficient professional training in ICT field, despite attending in-service training courses. It also became apparent through observation at Yenbai School and through available information on the actual state of teaching across New South Wales schools, that pedagogical knowledge alone does not guarantee that teachers will be able to implement recommended assessment practices in their classroom routine. This lack of opportunities for professional development in the ICT curriculum was reported in Statements of Learning for ICT at Australian Schools (Curriculum Corporation, 2006).

The interview data show that especially in Vietnam, the principal and ICT teachers did not create and promote specific local policies to improve quality of ICT teaching and learning in the school. Instead, the government agencies had general policies that the individual principals and teachers had to follow them in very rigid and undifferentiated ways. As such, they could not afford to explicitly design a local school policy for ICT educational quality.

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Further, the schools themselves did not have any follow-up method or assessment criteria to gauge the level of achievement by ICT students after graduating from school. To make a comparison at this point: the content in the Vietnamese syllabus was much more difficult than that of Sydney School, and what was expected of students at similar age levels in Vietnam was much greater than in the Australian case. It is important to note that at the Sydney School teachers had the freedom to update his teaching activities with novel lesson ideas and innovative teaching practices. The use of textbooks at Yenbai School was also very different from that at Sydney School: Yenbai teaching followed a fixed prescribed content and sequence, whereas Sydney School teachers planned and taught lessons using a variety of texts, materials, and strategies.

The Sydney School principal, George, hoped that as the students moved from school to university and into the world of work they would have a high level of digital competency. Similarly, the Yenbai School principal, Khoa, believed that the most important contribution of ICT was its supporting role in all areas of school management and in the development of human knowledge through fast and efficient forms of communication. As well, it was a distinct perception of the role of programming in ICT curricula so that for principals and ICT teachers, the role of learning programming was viewed different. For instance, both principals were not so concerned of school alumna becoming ICT specialists, while all the three teachers were interested to. The principals were interested mainly that students make sure they achieve the basic knowledge required to use ICT, while the ICT teachers were interested to see their students being capable of designing ICT devices and software in the future. Yet, this study has observed that actual official emphasis in Yenbai School has been marked by a strong public determination to succeed in becoming an ICT professional and programming skill emphasis, things difficult to achieve due to diverse material and pedagogical barriers. In contrast, we noticed that, at the Sydney School, it was not a strong emphasis on programming skills.

Communication and interaction between the two systems is not only possible but this research asserts that it is entirely natural and desirable. It is likely that comparative studies such as this can, out of diversity and difference, derive valuable lessons on the direction of ICT and the purpose of education. Differences in ideological foundations of each educational system, whether explicit or logically extrapolated, are likely to influence the perception of those within each system and needed to be kept in mind in observing characteristics of each system through reference to educational documents, interviews and observations of classroom practices in two different sociocultural systems. The aim then is to achieve a fair comparison of two quite dissimilar systems of ICT education. This was carried out by an analysis that pointed out common elements and similarities, on the one hand, and clear differences, on the other. The question of representativeness is particular important when it comes to both schools. Therefore, there might be limitations to the comparisons, but in this research, a theoretical, curricular and sociocultural justification for a fair comparison was obtained through our studies. As such, it is important to reflect on the dreams of quality ICT policies and teaching. It is important to study the differences between the target of achieving them and

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the present realities. All in all, we believe that this study might help to improve the ICT outcomes and design more realistic paths of achieving them.

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SCHOOL DISPLACEMENT: LEARNING OUTSIDE BORDERS

Ana Mouta, Ana Paulino, Hélder Quintela, JP-inspiring knowledge, Portugal

Borders and school displacement

Literature about the so-called *21st Century Learning Environments* advocates the huge changes of learning scenario in the contemporary world. But are classrooms really changing and to what extent is that happening? On the one hand, the challenges that surpass institutional environments are revealing the global turmoil in terms of economies, societies, cultures and borders. On the other hand, the worldwide data streaming and the easy access to information we have today, namely through the challenges posed by the hypertext, have turned learning into a rich field for debate, where a pool of concerns try to match investments (material and affective ones) with quantitative and qualitative outcomes. While curricula are changing (*cf.* United Kingdom 2014 Computing Curriculum) due to educational reforms that are comprised with multiple problematics all over the world, learning cannot be analysed as a commodity fashion that can be externalized from the event of meaning.

Although learning is context-dependent, it's definitively not school-dependent. This means that it is especially meaningful to think on the particular environments that the School can formally design for learning if we want to keep it as a relevant institution to merge personal and communitarian development with the changing worlds (the close and the distal ones) we live in. UNESCO General Education Quality Analysis/Diagnosis Framework (GEQAF) uses an Analytical Tool exactly to learn about these structured environments, in terms of its physical and psychosocial conditions, also considering the policy context they're in. In this regard, another significant work is done by the OECD. The OECD Educational Policy Outlook (2012) organized the education policies implemented between 2008 and 2014 according to (a) students outcomes, (b) institution quality and (c) effectiveness of governing systems. Issues such as equity (and quality), preparing students for the future, school improvement, evaluation and assessment, governance and funding were core across these policies. In this report, changing classroom practices is even considered as a fundamental part if we want to guarantee the quality of education provided by schools.

Even though all these efforts in terms of reforms that try to adjust educational strategies to the needs of evolving times – from physical/material structures to curricula and pedagogies –, we find conceptual and methodological resemblances across decades. In fact, the major learning theories and pedagogical strategies didn't always match over time. That is why we so easily find what may seem an educational *visionary perspective* when some distant dominant theory is around. So, what does the term *pedagogical innovation* stand for? According to Kirkland

and Sutch (2009), innovation refers to the application of new resources, approaches, processes or methods that change social practices in general, and teaching and learning in particular; it can also refer to a further development of existing ideas or products. Once innovation concerns application it has to do with its diffusion. The diffusion of innovation (Rogers, 1995) shows how it is dependent upon the perceived and observable benefits of it, as well as of its compatibility with the existing physical and human resources, its complexity, and its triability. Therefore, context plays a key role in what can be understood as an innovation. This seems to partially explain why some innovative views had short-lives and reappeared some years after as brand new perspectives, which are in fact embedded in several principles conceived before.

Nowadays, educational approaches that concern differentiation and personalization purposes justify a bunch of innovative methodologies such as the variants of blended learning: station rotation, lab rotation, flex and flipped classroom. The idea of the 21st Century Learning replaced *pedagogy* with *heutagogy*, where linear forms of expressing, living and understanding information are not conceivable and where Connectivism tried to explain the new dynamics of Constructivist learning, once people are commonly dealing with new media and started interacting differently with data and hypertext. One cannot forget Paulo Freire's Critical Pedagogy and the role played by "questioning" in its learning underpinnings when analysing totally personalised systems (e.g., Fontan Relational System, Columbia Britannica Education, Kunskapsskolan Education, etc.) and Project-based learning methodologies (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999; Moursund, 1999; Diehl, Grobe, Lopez, & Cabral, 1999). It is also interesting to notice to what extent principles of the so-called *innovative pedagogies* and some strategies already implemented decades ago are akin. Let's focus on particular defining characteristics of blended learning such as personalisation, mastery, and ownership, as well as on the spatial representation of a station rotation environment. In the beginning of the 20th Century, when behaviourist perspectives on learning were dominant, Maria Montessori already set learning environments where students of different ages could be seen, working through large periods of time, with several materials from which they reasoned their daily learning. These students had the opportunity to move freely within the classroom and work in different types of projects.

This example seems quite interesting to the main ideas this paper wants to prompt. How far is innovation really going? How do learning theories, strategies and psychological affective-cognitive learning processes can be thought when virtual environments enter the classroom space? Do they create opportunities not only to virtually displace learning from the classroom set but also to intentionally go outside classroom physical borders? To what extent can developmental goals (beyond the curricula) be formally conceived in these situations? And how can educational agents be guided to systematically get the benefits that the so-called innovations may bring, making them a living material to pedagogy enhancement?

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Pedagogy as a reflexive praxis

JP-inspiring knowledge (JP-ik) is a company focused on the development of services for education: from *Pop Up* schools to technological devices, methodological approaches to ICT and computing integration in learning, and multi-layer training. In the school year of 2012-2013, the Pedagogical team of JP-ik developed a qualitative study on the practices of ICT integration in formal learning scenarios. The aim of this analysis was to develop a Pedagogical framework to guide teachers through the process of integrating all the technology available in their learning spaces with larger development goals, the curriculum skills, the affective-cognitive processes of learning and the people that is expected to be targeted through this intentional action. Some of the frameworks proposed by the literature on this field (*e.g.,* UNESCO Knowledge Ladder, UNESCO proposals on ICT adoption, Mishra and Kohler's TPACK, Puentedura's SAMR Model) to guide and monitor ICT integration in educational territories were analysed in order to understand the capacity they revealed to systemically consider several influential dimensions. One of the questions the revision of these models raised had to do with the subsidiary role given to Pedagogy in the whole process. Let's focus on TPACK (Mishra & Kohler, 2006): is it accurate to consider Pedagogy one of those knowledge domains proposed in the framework (Paulino et al., 2015)? Shouldn't Pedagogy include all the decisions made on the Technology and Content dimensions? Considering it a theoretical *corpus* and a *techné* in itself that strengthens teachers in their own process of educability throughout life, any framework that addresses formal education strategies is expected to take Pedagogy as the process through which change may be intentionally conceived. Willing to screen the dimensions that are intentionally aimed and those affected through the integration of new technological devices in formal learning scenarios, JP-ik together with the University of Porto run a qualitative study under the responsibility of six pedagogical consultants and two supervisors. The six consultants worked in context with one ERTE-MoE (Ministry of Education Team for Educational Technologies and Resources) Coordinator, seven DRE'S-MoE (Regional Direction for Education from the Ministry of Education) stakeholders, eight municipality stakeholders, six school cluster principals, one principal assistant, twenty nine primary teachers, thirty seven parents and seventy six students. In a first phase, data was collected on representations, attitudes and levels of ICT integration (Paiva et al., 2012). Bearing the conclusions of this initial study, six pedagogical consultants worked directly within six classrooms of different regions of Portugal (rural and urban, from north to south) during a full trimester. All the activities with ICT were intentionally designed and then collected in order to understand the invariant categories formally considered in the tasks that proved to be more effective in terms of learning outcomes (e.g., performance, learning transfer, intertwining between collaboration and autonomy). From this study we came across the ik-Model depicted in the Figure 1. In this framework, *Signification* reveals the core of the pedagogical action: it is the medium of connection but also an effect of a meaningful bond between all the components of (formal) learning. The *Content* domain is the axis where learning goals addressed by the curriculum and other major developmental goals are formally included within the learning design. The *Processes* domain refers to the affective-cognitive learning processes and to the strategies

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conceived to target them. The *Technological* domain includes all the media available to enhance the learning experience. The *Relational* domain concerns all the people (and their networks) that can be reached in the process of making meaning out of the opportunities given by formal education.

Whatever the learning theory, educational model or learning strategies, these dimensions have proved to be sufficiently organic to match the diversity of systems with which JP-ik has been working all over the world, preserving their integrity and singularity. Within a model like this, the learning set may be easily selected, as the heart of the learning design is assured. This seems to be the case of the examples shared in the following lines, where the ik-Model is implemented as a basis for rethinking learning scenarios and goals beyond the curricula in two particular contexts: Bolivia, Jordan and Portugal.

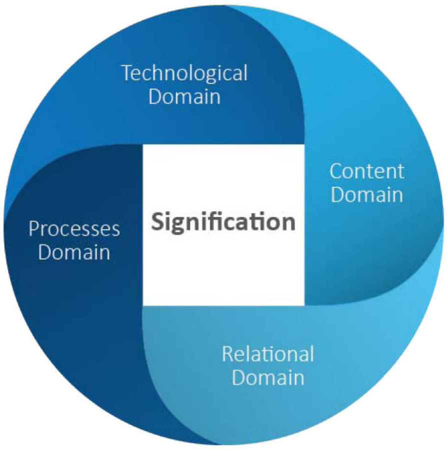

Figure 1. The ik-Model

Curricula and classroom' spaces: going outside borders

Bolivia: breaking down age barriers to learning

The Plurinational State of Bolivia is an interesting scenario regarding how the Educational System and Policies are responding to the challenges that Bolivian people are dealing with – those that come from their cultural and historical particular context (considering the critical topics of sociocultural diversity and multilingualism), as well as those that concern the complexities of living in the contemporary world. In fact, in The Bolivian Education law, it is stated that one of the Education goals is to reinforce intraculturality, interculturality, and multilingualism in education, empowering Bolivians, towards a society of Living Well (Ministerio de Educación, 2010). To use technologies is seen as a relevant part of the process of merging the cultural identity of the Bolivian nations and the native indigenous people, preserving their diversity above all. The *Socio-Community Productive Educational Model* (MESCP) is the basis to conceive all learning experiences, where the cultural heritage shall be preserved through the recognition and practice in all native languages. In this context, in July 2014 a group of 90 people, from elements of the Ministry Education, to teachers and students of Educational Sciences were trained in the ik-Model: this framework was conceived as a

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guide that would help them systematically integrate all the challenges coming from their formal educational new demands. It was the basis of an activity design – the *Potato Legend* – that fully addressed the mentioned requisites and that we shortly present in this paper. Students were encouraged to go to their natural living contexts and to explore meaningful legends from their local community. The purpose was to collect these legends from their community older people, in their specific dialects, and then to illustrate them and translate them into Spanish, using the different available technologies, in order to create a video. One of the stories produced reported to the *Potato Legend*. In this project we may see hand-drawings combined with video and sound edition, and the native languages as told by the ancient ones with Spanish subtitles created by the students that known that native language. To produce this video, kids of primary education were using their own tablets with a lot of outstanding software, but the way the Relational domain of the ik-Model was conceived made them recognize that the unique medium that enabled the accomplishment of their task was storytelling from the older people of their communities. This was a way to preserve ancestral heritage, emotionally linking generations and making them learn with each other. Whereas students met these mesmerizing narratives, the older ones got in touch with new media that made them curious as they got surprised with all the possibilities they enabled. Students learnt through this unexpected encounter and they have also learnt while working with their peers to produce this video, exploring their creativity and accountability using traditional and non-traditional techniques, collecting folk music and structuring all the narratives in terms of the consistency expected in terms of the Spanish subject. The collection of these tales through the students' participatory process made them conscious of their role in the preservation and valuation of their cultural roots, simultaneous reinforcing their self-esteem and sense of belonging. The amount of the audio-visual products shared are expected to enrich Bolivian cultures dissemination (Mouta, 2015). This activity is a great example of an entwining of *old* and *new* technologies, of classroom and community opportunities, from peers to intergenerational learning, where the experience of learning doesn't know space or medium edges.

Jordan: go further going virtual

In the Hashemite Kingdom of Jordan, Education is assumed to be crucial for individual and societal development. The general objectives and educational policy principles defined for the Jordan Educational System (Ministry of Education, 2010) clearly show that perspective: there is an evident focus on Educations' responsibility in terms of students' empowerment towards an active and committed citizenship. It is expected that students become capable of contributing to the global interest of the society, balancing tradition – namely the respect for the historical, cultural and ideological national heritage –, and innovation – where the use of new technologies and scientific methods is valued in order to solve problems, develop knowledge, and innovate (ibid.). Assuring social equity and quality education for all is another structural principle of the Jordan Educational System, that is not only concerned with the gifted and special needs learners, but also with the gender parity topic, as it becomes particularly critical in terms of education access and integration in the labour market (UNESCO, 2012). The educational aims for the Jordanian students are clearly defined beyond

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the curricula; they encompass sustainable generative goals and competencies, and consider new technologies as important tools to reach them, in the context of new learning approaches and pedagogic methodologies.

The Jordan Education Initiative (JEI) is an important local player considering the enhancement of education, creativity, and general capabilities. It envisions fast educational reforms through ICT integration and innovation, and JEI's team is responsible for the design, implementation and monitoring of several innovation pilots based on this standpoint. They are working together with JP-ik in the *Pop Up Digital Classroom Pilot* in Jordan that goes straight to these points; JEI was an active player in the design of the educational project for this school and is now responsible for its local monitoring and support. The Pop Up Classroom is installed in the Princess Taghreed School, a girls' school in the suburbs of Amman. It has been intentional to place this school in a particularly demanding and disadvantaged social context and to target girls and women. JEI was an active player in the design of the educational project for this school and is now responsible for the local monitoring and support. The strategy for ICT educational integration within this learning space has been considered along with the ik-Model since the beginning of the project, taking advantage of the relevant synergies between the conceptual visions of both JP-ik and JEI. The main goal of this project is to use this digital classroom as an enhanced scenario for learning, where new and traditional technologies are combined with renewed pedagogical strategies, in order to foster greater opportunities for teachers and students, and to explore broader perspectives in terms of their lifelong learning. In this experimental context, students will approach social problematics through means beyond those suggested by the curriculum. Teachers are expected to favour meaningful opportunities that make their students explore and develop their skills and their actual and future selves, considering more diverse academic and professional possibilities. A good example is one learning activity that has been created to the Secondary level, in order to address English and Sciences curriculum goals, along with several sustainable development and generative aims, such as gender parity, vocational development, media literacy, critical thinking, communication and knowledge transfer. The idea here was not only to make girls explore their interests on these areas, but also to make them question the gender professional stereotypes associated to STEM. Starting with Sciences, students were encouraged to use the available new technologies connected to the Internet to explore the life, accomplishments, and skills of women that became known as scientists (from Jordan or somewhere else) and then talk about them in Arabic and English in a way that challenged narrow thoughts based on prejudice. The aim of this activity was not only to know historical facts and figures in both languages: by exposing students to other symbolic role models, the idea was to bring them the opportunity to give personal meaning to that content, benefiting from the exploration of their own values, interests, and skills, projecting themselves into the future and avoiding the idea that there are *gender occupations*. The boarders of the traditional classroom were clearly broken, as teachers were informing, modelling, and supporting these girls trough a relevant community interaction (Law, 1981) that was virtually brought into the space of exploration and group discussion. This enabled to go beyond the possibilities given by the personal and collective experiences and narratives of the people that

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are part of that learning space, expanding visions on human action, especially in what concerns those that are predominantly socially informed.

For the teachers in charge of this Pop Up Classroom, the ik-Model was considered a noteworthy guideline as they were just starting to deal with several new demands on what formal education should become. Those demands had to do with new technological devices that were expected to be experimented in a way that made the most of their potential if pedagogically driven. Furthermore, the borders of the physical/material context where the School was built were continuously questioned by the intentional consideration of social developmental goals. The Content domain aligned with the Processes domain axis enabled teachers to prepare activities that activated deeper connections between though, affections and skills, making students understand the complex relationship between learning and behaviour. Signification was here seen as the engagement with processes of questioning, willing and acting that comprised personal criteria in the process of making choices throughout life.

Portugal: from gamified engaged learning to meaningful role-taking

Although in 2008 all primary schools' students were given a personal laptop and schools were equipped with interactive whiteboards and connectivity, the experience of integrating ICT in education is not a consistent one in Portugal yet. A comprehensive study (Paiva et al., 2012) found very different visions and practices all over the country, as well as a significant gap between the meanings and the effective uses of new technologies, both at school and at home. These differences were particularly ascribed to the inconsistency of the initial training received by the teachers in what concerns the pedagogical integration of ICT. Even though it has been possible to find some meaningful experiences where digital and analogue worlds match in the pure benefit of development, it was clear that an integrated approach with a pedagogical ground was needed to fully achieve the potential of using ICT for intentionally learn. A pilot project that involved six public primary schools was designed and implemented by JP-ik aiming to respond to this challenge; this pilot made it possible to identify several meaningful and impacting examples of ICT use for learning systematic purposes. That is the case of a primary school located in a particularly socio-economic problematic neighbourhood of Oporto in Portugal. At this school, technology was integrated with the will of keeping students in the educational system, avoiding dropouts. In the beginning of the Project, teachers were trained in the ik-Model. These guidelines helped them to conceive learning session plans that made ICT only an excuse to reconsider practices and to reconfigure learning experiences that started including different theoretical aspects that worried them. One of the teachers has created a really intriguing activity, considering her 3rd grade students' perspective when asked about it. The goal of the task was to learn about the value of money, connecting it to the study of Geography and Mathematics. The teacher proposed a flipped approach to a new theme: students were asked to learn on coins and notes at home through an educational site of the European World Bank, so that they were able to use that knowledge to play a game during the next day classroom activities. On that day they started the class by playing games of that website in pairs, what allowed them to discuss their doubts and learn a little bit more with each other. The teacher was around, giving them occasional support. At

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the end of the games, students were supposed to make questions to other groups about the differences between world currencies and the ways to find the veracity of the notes in circulation. On that day, students collected some fruits and vegetables from the school garden and prepared a biological market where those products were sold to the school community. During that experience, they had the opportunity to apply their learning in a role-taking situation, which also required their capacity to rapidly respond to Mathematics basic operations. All the items bought were introduced in an Excel page and in the next day these students had to verify discrepancies between the remaining products and those that were registered as sold. The money they have collected was kept in the savings for the Photo Album they were going to create by the end of their four years of Primary Education.

This activity clearly shows that there's no frontiers between subjects, helping students integrate knowledge in a continuum. Added to the experience of applying learning to meaningful contexts and to the flipped approach, students get a holistic feeling of what learning is about and freely engage in practices that widen their possibilities of recognizing, expressing and connecting with others, making the most of the artefacts they are able to grab.

Conclusions

All the mentioned examples have a noteworthy centrepiece in common: they all prove how narratives are important in the learning context. To call them "learning stories" has never been so meaningful. In fact, all the goals that are supposed to be achieved and all the available media could turn the learning space into a scattering scenario rather than an opportunity to learn how to learn and move through information in an intentional and personalised way. If it is true that new technologies create conditions to rethink the formal learning experience when one really wants to get the potential they may bring, it seems also acceptable to believe that the driver for innovation is not really rooted on those technologies but on signification as the heart of any planning in education. In this context, to signify means to link information and people to personal ways of performing sense, in a diversity of scenarios where meaning prompts as pure continuity. If learning is displaced by nature, the sense of formal education is not exactly on its physical placement but on the possibility of placing several worlds in a narrative that merges them from within.

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DESIGN CHALLENGES FOR AN E-LEARNING ACCREDITATION SYSTEM FOR THE REPUBLIC OF MALTA

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Introduction

In response to an increased demand from education providers, including offshore educational providers, the Maltese Government has decided to examine the design of a national accreditation system for e-learning in Higher Education, with particular emphasis on non-traditional forms of education such as MOOCs. This paper describes the first two steps of a design thinking approach, to consider the challenges and opportunities which are informing the thinking of policy-makers, and examines the scenarios which may arise out of each one, with the aim of providing a basis for future ideation, prototyping and testing of an accreditation system.

Context

Malta has one of Europe's smallest Higher Education Systems, with approximately 12,600 students in tertiary education in 2014 (Eurostat, 2016). Traditionally, the educational system has been dominated by three large public providers, namely the University of Malta, the Malta Centre for Arts, Science and Technology and the Institute of Tourism of Studies, which have accounted for the large majority of this cohort (Eurydice, 2012). In recent years, the number of Higher Educational Institutions has increased significantly, with over 30 institutions accredited as Higher Education Institutions, i.e. to offer qualifications at levels 5 through 8 of the European Qualifications Framework (EQF), and a further 45 accredited to offer qualifications at EQF 1 through 8, although in most cases these offer a majority of courses at levels 1-4 (National Commission for Further and Higher Education, 2016).

All qualifications in Malta are mapped to the Malta Qualifications Framework (MQF), which is made up of eight levels and which are mapped on a 1 is to 1 basis to the European Qualifications Framework (National Commission for Further and Higher Education, 2016). The Maltese system for accreditation of institutions and programmes is run by the National Commission for Further and Higher Education (NCFHE), which serves as Malta's Quality Assurance Agency for Higher Education, its qualifications recognition information centre as well as the government's policy and research arm for Higher Education.

Maltese legislation (provides for three kinds of accreditation, namely:

- accreditation of institutions by law (self-accrediting) – this is a privilege limited to the three public institutions mentioned above;
- accreditation of institutions by the National Commission for Further and Higher Education – institutions need to be a body corporate, as well as meet criteria linked to:
  - having an accredited programme on the MQF or EQF;
  - performing due diligence tests on the head of institution and academic staff;
  - establishing and maintaining an internal quality assurance policy;
  - complying with venue regulations;
- accreditation of courses, programmes and modules – all qualifications which are linked to the Malta Qualifications Framework require accreditation, either by NCFHE, or by the self-accreditation institution.

All institutions must additionally undergo periodic quality assurance reviews to maintain their licensing. These are conducted according to the Maltese Quality Assurance Framework which was designed to be in full harmonisation with the European Standards and Guidelines for Quality Assurance in Higher Education. It is envisaged that this will be certified through an application to the European Quality Assurance Register in the near future.

Policy trends

Maltese educational policy in the field of further and higher education for the years 2009-2020 envisage a set of 12 strategic priorities (National Commission for Higher Education, 2009) which include objectives to:

- attract more students to continue their studies after compulsory education into post-secondary and university studies;
- attract foreign fee paying students to study in Malta in various fields of study and research;
- assure quality provision across all institutions and their programmes.

It is forecast that meeting these goals requires a significant expansion in higher educational provision (both in terms of volume of students catered for by current providers, as well as by the entry of new providers into the system), as well as a significant increase in quality assurance regulation and activities. While no mention is made of e-learning in 2009 policies, the recent Higher Education Strategy for Malta makes specific mention of promoting the development of e-learning as a means of widening participation in Higher Education (Ministry for Education and Employment, 2015).

The last 18 months have seen intensive policy activity in the areas mentioned above. The government has been actively incentivising foreign HEIs to open institutions in Malta with the result of nine new higher education institutions being accredited. Increasingly, e-learning

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is being seen a way to accelerate this expansion, with the government beginning several exploratory initiatives, including workshops on e-learning quality for local higher education providers, and the commissioning of a report on opportunities arising out of MOOCs and other non-traditional forms of Higher Education.

Objectives of an accreditation system for online learning

Malta has a significant tradition of using legislation to not only regulate sectors, but also to provide appropriate incentives for growth of local industries, and attraction of foreign players into the market, while at the same time maintaining high standards of consumer protection in full compliance with European Union legislation. This approach has led to enormous growth of a number of service-based sectors in Malta including with regards to aviation, shipping, financial services, internet-gaming and healthcare.

Taking this into account, the possible objectives of an accreditation system for e-learning come into frame, namely to:

- provide incentives, via a light, robust and recognised regulatory framework, for both local and foreign players to open e-learning institutions within Malta;
- ensure a high level of protection for all students studying with Malta-based providers, as well as for Maltese students pursuing education from non-Maltese providers;
- ensure full compliance between the Maltese regulatory framework and European instruments for recognition and portability, in particular the ESGs, EQF and ECTS;
- allow for sustainable growth of quality assurance and accreditation services, in line with the above priorities.

Thus, a properly designed regulatory framework should lead to increased opportunities for Maltese students for study, increase overall employment in the education sector, as well as increase government revenues, without comprising quality.

Challenges to quality system design

Accrediting online learning, with a particular emphasis on leads to three sets of challenges of inter-related challenges, namely:

Jurisdictional issues

It has long been recognised that course design, delivery, assessment and award of credit must be viewed as separable processes, which might be coordinated by separate actors, possibly even by separate organizations in different countries, with a multitude of different jurisdictions being involved – a phenomenon known as unbundling (Camilleri et al., 2012). Even within a single course – the administration office, legal representative, course design team and assessment centre might be located in different locations, or even be run by subcontractors.

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While providing legal accountability is relatively straightforward, by requiring an institution licensed in Malta to either establish itself in Malta, or at minimum provide for a legal representative based in Malta, regulatory accountability is a much more complex issue. Thus, for example, if an institution is based entirely in non-EU third country, but chooses to offer a course under the Maltese licensing regime for the purpose of awarding ECTS, should the Maltese regime recognise the Quality Assurance system of the third country, accredit the institution the nationally, or only accredit a programme if there is a foreign (reputable) accreditation?

While not perfectly applicable in this case, the Council of Europe's code of practice for the provision of transnational education states that *awarding* and *providing* institutions are fully responsible for quality assurance and control (Council of Europe, 2002), indicating that verification and control of activities at each site of an institution would be required. However, it does not indicate how to share responsibilities for the control and quality assurance between different regulatory authorities. Rather, the avoidance of double-accreditation is currently left up to mutual agreements between different quality assurance agencies (European Association for Quality Assurance in Higher Education, 2015).

Quality management issues

Challenges around quality management essentially boil down to two issues: scope of the definition of e-learning, and equivalence of e-learning with "traditional" processes. These two issues can be rephrased as:

- What constitutes an e-learning programme, and how is it different from a "traditional" programme?
- What constitutes an e-learning provider, and how is it different from a "traditional" provider?

We postulate that, from the perspective of Maltese regulation the essential difference between an *e-learning* and *traditional* programme is that in the former, the concept of physical contact hours has been replaced with a variety of different options. The table below gives some examples of types of contact hours and their e-learning equivalents:

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Table 1: Some examples of types of contact hours and their e-learning equivalents

Purpose of the Contact Hours	Traditional Tool	E-Learning Tool
Transmitting Knowledge (i.e. the teachers' interpretation of information) from the teacher to the student using a variety of media	Lecture	Video-lecture
Answering student queries	In-Class Questions In-Office Visits	Synchronous Communication Tools (chat, video-conferencing, etc) Asynchronous Communication Tools (e-mail, forums, etc)
Supporting Students in Learning Processes	Workshops.	Workshops performed over synchronous communication tools
Checking student knowledge	In-Class interaction (raising of hands, etc)	Formative assessment questionnaires built into a learning management system

Verifying that students still have adequate contact hours in e-learning would again be relatively simple to a well-designed quality management system, however a challenge remains in defining equivalence in contact hours between e-learning and traditional learning tools.

With respect to the provider-level of quality assurance, we postulate that the only significant difference between an *e-learning provider* and a *traditional provider* is that criteria on physical facilities required for the latter make little sense in the context of e-learning/virtual providers. However, as already indicated, the opportunities technology offers for unbundling and trans-national provision, seems to indicate that creating a distinction in QA between purely national, and trans-national providers would lead to a better organization of the QA system.

Issues relating to data and trust

Any successful system of quality assurance needs to be able to have the full trust of all its stakeholders: namely students, higher education institutions, employers as well as society in general, as represented by the government. In the context of trans-national provision, it also needs to enjoy the trust of these same actors in each country where it operates, or where its qualifications may be recognised.

A number of European tools already exist to help facilitate the build of such trust, including networks of quality assurance agencies, such as ENQA and INQAAHE, processes of external review such as those leading to inclusion in the European Quality Assurance Register, and transparency instruments for qualifications such as the diploma supplement and the EQF.

In the Maltese context in particular, communicating its quality procedures outside of Europe involves the communication of the Maltese system with European norms, regulations and guidelines. It also involves communicating the benefits of, e.g. trans-national provision described in terms of ECTS versus the advantages of other transparency instruments. Should the Maltese system also choose to accredit non-traditional learning such as MOOCs, it will also require the communication of the verification procedures to ensure equivalence vis-à-vis

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traditional learning within the European Higher Education Community, to ensure that recognition is granted in the sense of the Lisbon Recognition Convention.

Conclusions

Having described the context and identified potential problems, the next phase of development should be ideation. Our analysis indicates that the key success factors leading towards a successful system for accreditation which will grow and incentivise the sector will need to:

- provide lightweight accreditation for trans-national providers, through exchange of information directly between quality assurance agencies;
- include a method for verification of information received from foreign quality assurance agencies;
- prove equivalence between non-traditional forms of learning and their traditional counterparts, for the purposes of determining workload, and hence allowing for credentialisation;
- include adequate safe-guards to ensure that Maltese regulatory and legislative bodies have full jurisdiction over all aspects of the operation;
- describe all learning and qualifications in terms of existing European transparency and recognition tools;
- make a convincing value proposition for European-accreditation to non-European based courses and institutions.

Our analysis also suggests that the prototyping and testing phases would benefit significantly from full involvement of European and non-European stakeholders in the sector, so as to integrate their requirements into any framework produced, and increase trust and transparency of the same framework.

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DIGITAL CREATIVITY FOR NET GENERATION STUDENTS: RETOOLING THE ART AND DESIGN ENVIRONMENT AT SCHOOL

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In arts education, the *iconic turn*, the steady increase of images and icons in communication and the appearance of multimedia art works became an agent for paradigm change in the 21st century. Beyond fine arts, contemporary curricula focus on visual communication that includes digital graphics, photography and video. Research has consequently intensified on the skill structure and developmental stages of the *new child art* and the need for a suitable learning environment soon became evident. In Hungary, digital pedagogy has only targeted the visual arts in the last decade when tablets and smartphones began to offer numerous imaging options that invaded social web pages. Digital child and youth art has by now become a curriculum component in many countries and the art studio has integrated e-learning technology and pedagogy. This paper summarises Hungarian experiments in developing a new, creative learning environment for art and design education.

Introduction: retooling the art and design education environment in the 21st century

The *iconic turn* (Moxey, 2008), resulting in increased importance (and, in social media, the predominance) of visual language became an agent for paradigm change in arts education in the 21st century. Digital creativity found its way to the UNESCO Policy Brief on Digital Literacy (Kárpáti, 2011) and contemporary curricula shifted focus on visual culture including digital media – major forms of expression of adolescents (Duncum, 2002; Freedman et al., 2013). In a recent study to develop the Common European Framework of Reference for Visual Literacy (CEFR_VL, Schönau and Wagner (Eds.), in preparation for 2016) visual literacy, understood as a competency, as it is manifest in certain situations. Visual literacy as a subject-specific competency is embedded in an interdisciplinary, general educational concept integrating *self-competency, social competency* and methodological competency. This approach indicates the need for a reconsideration of the art and design education environment and integration of digital technology and pedagogy in aesthetic education the way it is already manifest in self-expression and social life. Developing competences of visual expression and creation cannot be restricted to media in use for centuries – they have to find a synergy of working in real and virtual space through tangible and digital tools.

Figure 1. On the left: Giovanni Francesco Carroto: Portrait of a Young Boy Holding a Child's Drawing, Verona, Castelvecchio Museum, about 1515 – On the right: Girl with her multimedia work on a tablet, Eger, Laboratory School of Eszterházy College, 2014

Traditional assessment practices (mainly testing realistic representational skills only) have become obsolete and art education research turned to the structure and development of new, partly digital child and youth art (Boughton, 2013). Manipulating objects in space through two-dimensional abstractions has been accepted as a valid means of identifying spatial skills and assessing them – however, working with generations of students deeply immersed in multimedia technology, many teachers find this solution unauthentic and idiosyncratic. Edutainment and gaming applications (like those developed by the Quest to Learn project, http://q2l.org) have long been using sophisticated virtual spaces that activate skills ranging from orientation to memory, manipulation to construction. KINECT applications (http://www.xbox.com/hu-HU/KINECT) transmit real movement to virtual space and thus provide authentic orientation experiences and is being already used in museum education. The Leonar3Do software (http://leonar3do.com) enables users to manipulate in real space and create 3D images that can be shown through a 3D printer as sculptures or objects. The software is in use at art and design academies, universities of technology and medicine, but its utilisation options for public education still has to be developed.

We employ digital technology in two forms: first, to provide students with a personalised, flexible, online practicing and testing environment. Second, we started experimenting with three-dimensional (3D) software solutions that provide authentic methods for creation, manipulation and perception of space in a dynamic virtual environment. In this paper, we give a brief account of our first results comparing traditional and innovative evaluation methodologies.

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Developing a new learning environment for digital creation

In a longitudinal study to describe the visual language of children and adolescents of the 21st century, we have asked some educational institutions where digital technology was regularly used for teaching and learning, to do the drawing tasks using digital tools as well as traditional ones like pen, pencil and paint. Four tasks were selected – three with a narrative character to avoid the use of schemes and clichés from cartoons and animated films and a completion tasks to investigate hidden skills that are not needed for young children to express their ideas but are part of their visual language and when revealed, they may be may be further developed in art education. The first task was a map of an (imaginary) place children want to (re)visit, the second was a dwelling design for a favourite tale / film / cartoon character, the third was a task for self-expression: a double portrait in the favourite / most hated dress in happy and gloomy mood. The two completion tasks involved the creation of a landscape and an interior space. Assessment criteria included *task centeredness* (understanding the theme provided and developing an image accordingly), *expressivity* (using the visual language in a manner to share ideas and moods), *image development level* (ranging from scribbles to shapes), *use of colours* (as signifiers or representational tools), and *composition* (arrangement of forms and their interrelations in the pictorial space). In Kindergarten, with children aged 2.5-6, we experienced no problems with digital media. Using tablets and laptops and drawing on the interactive whiteboard was a familiar activity for most children – not always from own experience, but from observing their peers. (Mobile computing tools seem to be widespread in middle class Hungarian homes from where children of our experimental sample came from, even in those with a below average income). *There was no quantitative (developmental level related) difference between digital drawings and those prepared with traditional tools*: crayons, pencils or felt-tipped markers as most digital imaging tools for children resemble traditional alternatives.

Figure 2. Drawing digitally on laptop and interactive whiteboard (on the left) and tablet (on the right) at Óperenciás Kindergarten, Budapest, 2015

In terms of *style and working processes, we found significant differences between the traditional and digital environments*. Both support pair and group work, but digital imaging seems to motivate for more exchange and co-operation, perhaps because of the ease of correcting faulty lines and patches on the screen. Traditional images are richer in detail and manifest better proportions, while digital images developed on interactive whiteboards and tablets show more

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complex composition, sharp colour contrast, and more signs and symbols. Clearly, experiences with digital images influence the style of creation: social media are rich in symbolism, and tend to use vivid colours and sharper contrasts for a more immediate effect, children using digital tools will at likewise.

For art education, digital imaging offers an excellent opportunity to educate for safe, expressive and aesthetically pleasing self-expression. Creation with traditional tools is important for skills development and the preservation of cultural heritage, but it is the digital media that children and young adults will regularly practice. School art and design studios must therefore be furnished to satisfy the need for digital self-expression.

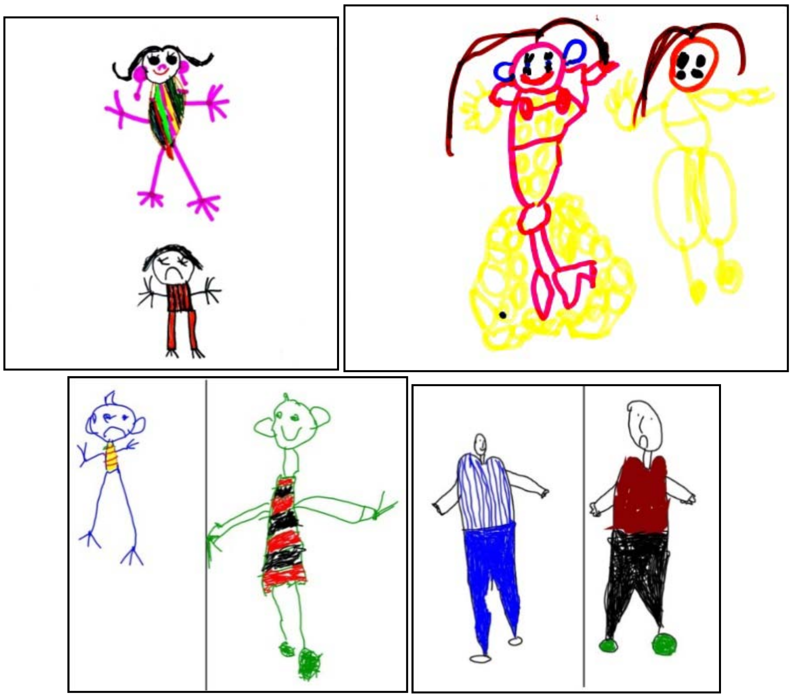

Figure 3. Self portraits in a happy and sad mood, with felt-tipped pen (on the left) and Paint software (on the right) of a girl and a boy aged 4 years, Óperenciás Kindergarten, Budapest, 2015

At the Eszterházy College of Eger, researchers (among them, authors of this paper) decided to adopt a new, trialogical model of innovation and introduce mobile learning devices (tablets and laptops) parallel with in-service teacher training and mentoring. In the course of ten years, in 2004-2014, three generations of mobile devices (e-paper, laptops and tablets) were introduced and their integration in teaching and learning carefully documented (Kis-Tóth et al., 2014). Primary and secondary school teachers received devices for their personal and professional use and were enrolled in weekly introductory courses by experienced IT trainers and didactics specialists to acquire both technological and pedagogical content knowledge. Mobile devices were introduced to students by their IT teachers first and their special functions were then put to use by their discipline teachers (on primary level, generalists). The sequence of retooling experiments had constant and changing elements. Constant elements included the *1:1 access to mobile tools*. Teachers were provided with these tools for school and home use – a feature that proved to be decisive for success, as teachers need more time than students to adapt to new infrastructure. Students got access to mobile tools furnished with

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learning materials at school only. Later, when learning content was gradually made available through dedicated school web sites, a BYOD model could be offered for some disciplines.

In-service training courses and personal or group based mentoring also belonged to the constant elements of the project sequence. Innovation in education needs constant professional support, and the more profound educational changes are, the more personalised this support should to be (Kárpáti & Dorner, 2012). At the Eszterházy College, discipline-based teacher groups were formed and two types of mentors (IT specialists and college staff teaching didactics) were provided. In the course of five years, more and more school disciplines were involved. First, the languages and natural science subjects, then also the arts. During the last term, interdisciplinary competencies were developed as integrated arts and science projects initiated. Art educators also formed a mentoring group and developed a series of successful and motivating art and design projects.

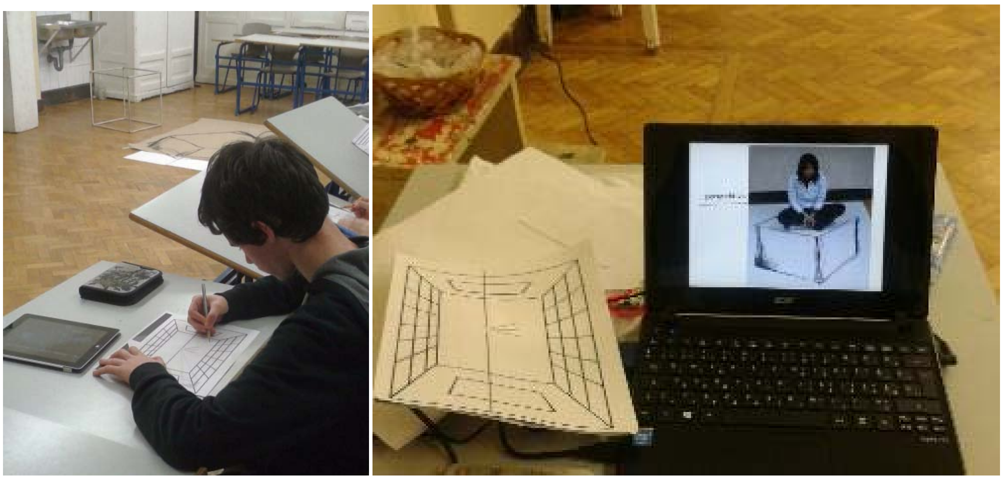

Figure 4. Using tablets in art class: studying perspective in life and in visual representation through self-made photo sequences and drawings (Secondary Grammar Laboratory School of Eszterházy College, Eger, 2014. Grade 9, age 15 years, Art and Visual Culture teacher: Eszter Igric)

The Noldus Observer XT video-based interaction analysis software was used to analyse actions and, through facial expressions, also attitudes and moods during the use of digital tools. Already in the first phase of integrating mobile solutions as learning tools, teachers employed them both in formal and informal learning. Working with laptops in the schoolyard or the neighbouring forest during a Biology class, documenting works of art in a museum with tablets made informal learning easier to integrate with formal, disciplinary studies. Teachers could easily call forth images and text produced or collected outdoors during classes and were thus encouraged to expand the learning environment and think outside the (school)box when planning a learning sequence. While Classmate PCs and e-books involved more static classroom management with limited pair and group work, teachers utilised the increased mobility of tablets and iPads to involve student teams (often from several cases and grades) to work collaboratively at field trips or school bad informal learning events.

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Developing a new learning environment for digital assessment

The Hungarian Diagnostic Assessment System, eDIA, developed by B. Csapó and Gy. Molnár at Szeged University, Research Group on the Theory of Education, provides an internationally unique educational environment for interactive online testing through dynamic, multimedia tasks (Molnár et al., 2016). The Arts section of the testing system assesses spatial abilities, colour sensitivity and visual communication. Visual communication tests contain about 120 interactive tasks. Content ranges from decoding images, sorting and matching styles or concepts to learning from infographics, and cultural interpretation. Taken by more than 2000 students aged 6-12, the tests are reliable measures of assessment and also applicable for development of visual skills. Eye tracking is being used for item improvement, and it also reveals perceptual patterns and decoding strategies of students. Digitally literate children perform best in modality change tasks but have problems with matching concepts with complex images. Perceptual style also influences visual communication.

The wide variety of item types integrating sound, image, video and animation and functionalities like colouring and rearranging images, entering text, pairing words and pictures are ideally suited for the analysis of verbal and visual communication forms using multimedia. (Simon, 2015; Kárpáti & Simon, 2014). In the *Visual Culture* test package, practice items are provided that show manipulation options and also a voiceover for slow readers. Visual communication tests containing 200 interactive items were developed by Tünde Simon in co-operation with professional communities of art educators and piloted with class size samples and results discussed with art teachers of the schools. Item contents involved recognition, interpretation, visual analysis, abstraction, symbolisation and visual dynamics. Stimuli were selected from fine, applied and media arts as well as infographics and scientific visualisations. Abstractions items included tasks for conveying essential meaning through reduction, simplification, emphasis of main features of an image, modality change (visual representation of verbal text, music, sounds, gestures, etc.) and use of conventional abstraction systems (e. g. languages of scientific visualisation, interpretive drawings, process graphics, sign systems).

The eDIA testing environment performs diagnostic, criterion-oriented assessment and supports the creation of individual educational programs. As a result of our visual skills research project, the development of skill components can be determined and special applications prepared to identify talent or fight deficits. Figures below illustrate how this testing and development environment can be suited to perceptual styles of primary school students, using real life representations and abstractions.

Static online tasks for the assessment of spatial skills

Drawing conventions for representing space in two-dimensional form has traditionally been one of the central tasks in visual skills development because of its relevance for a wide range of professions. Digital image processing software, the virtual spaces of computer games, the multimedia tools and applications, however, have significantly altered our visual thinking and the perception of spatial relations as well. Through the use of digital images we can visualize

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space in a more authentic manner and reproduce the complex spatial situations accurately. These types of tasks can imitate real-life spatial problems that we encounter every day. Manipulation in virtual space is also being employed at the Harvard Mental Imagery Lab (http://www.nmr.mgh.harvard.edu) where a spatial aptitude test is developed using Virtual Reality and Augmented Reality solutions.

Our methodological objective is to integrate these digital solutions in educational assessment in the visual arts. Spatial skill components (mental and physical manipulation, transformation, completion, planning, construction, etc.) are also valid indicators of the developmental level of visual skills and therefore often used for the detection of talent. However, from the copying exercises of gypsum models of academies, through studies of old masters and careful representation of arrangements of objects, tasks required activities unrelated to real life experiences of creation and perception of space. *Spatial positions, relations, directions* (e.g.: sense of direction, distances connected with changes of measurement, orientation in the built environment/ orientation virtual reality), *comprehension of structures of 3D shapes* (e.g.: parts and whole, connections among structural elements, spatial bulks and their concave-convex extensions, covered elements, regular-irregular spatial structures), spatial reconstructions (e.g.: projection drawings, section planes, ground plan –elevation –layout, point of view, spatial abstractions, reductions) as well as *spatial transformations and manipulations* (e.g.: mental cutting, rotation, removal, mirroring, assembly and construction) can be evaluated through the tasks that Bernadett Babály developed for the eDIA system (Babály & Kárpáti, 2013).

The spectacular visual appearance of the tasks makes them not only enjoyable for children, but also easier to comprehend than the black-and-white abstract axonometric projections in traditional paper-based tests. *Digital literacy* does not play a significant role as the testing environment includes functionalities well known from virtual environments frequented by the subjects, students aged 6-12 years. Some abstraction items were also found easier than expected as they contained modality changes often encountered by adolescents who regularly use social web sites and gaming environments. Other items for matching concepts and images, however, were found difficult, although the concepts occurred in art education regularly. Visual analysis and symbolisation tasks were of medium difficulty. Eye-tracking studies revealed that *test page design* was one of the most important factors influencing task solution. The arrangement of the text and image block and the *colour and size of the text and action buttons* affected viewing time and their use often resulted in an extra cognitive load on top of item solution towards the end of the test. *Familiarity of images* contributed to item difficulty, even if the question was not related to image content or authorship. Issues of *item complexity* analysed by eye-tracking resulted in an improved version for several tasks that are now divided into two or three more transparent and visually comprehensible items.

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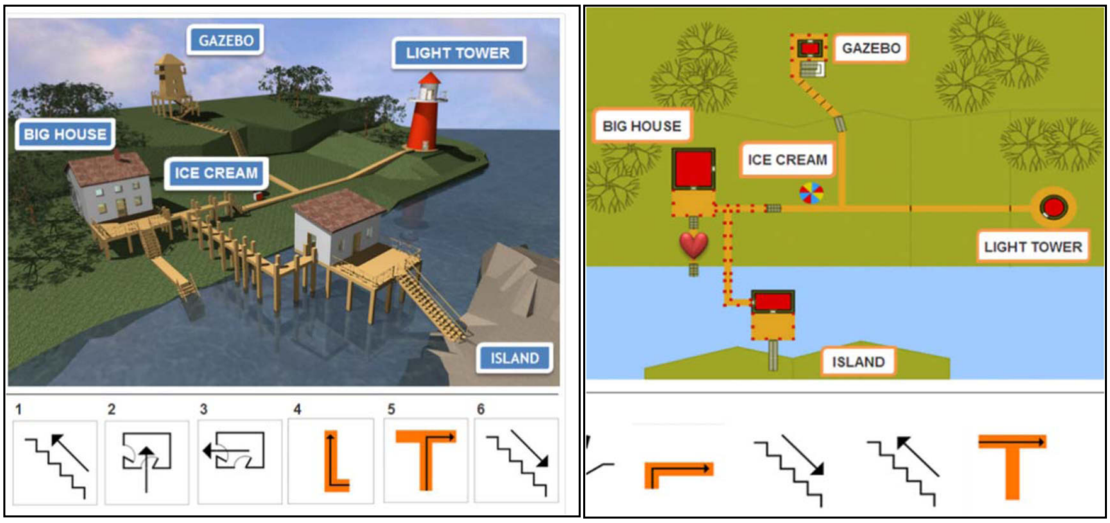

Figure 5. Two orientation tasks with different degrees of realism and symbolism for Grades 4 and 5 (left) and 6-7 (right) – A task from the eDIA testing environment. (Screenshot, September 2015)

Text comprehension level may also be an important influencing factor. Eye-tracking and post-hoc interviews with students and teachers revealed items with ambiguous or lengthy text and facilitated their improvement. In the next iteration of the tests, students will also take a verbal comprehension test in the online same testing environment to detect the influence of verbal skills on visual communication. *Reading skills* did not affect task solution, as an optional voiceover could be used by slow readers. *Comprehension strategies* of *visualizers* who quickly scan instructions, observe all images first and then look for matching concepts and *verbalizers* who carefully read and re-read the instructions and the concept list before observing the images also contribute to performance level in visual communication tests. Eye-tracking helps compile tests that include a proportionate number of items for both strategies. This result seems most relevant for pedagogy as both strategies can be modified through art education.

Dynamic imaging and modelling for the development and assessment of spatial skills

Spatial relations may best be observed during action in real space – but how can we integrate such experiences in a testing environment? The solution of this crucially important issue of authenticity was the inclusion of the GeoGebra dynamic mathematics software (http://www.geogebra.org) in the battery of testing tools to provide dynamic visualisation options (Kárpáti, Babály, & Budai, 2014). GeoGebra was created by Markus Hohenwarter and originally intended for use in secondary level science and mathematics education. It is available as an open source application and works with any platform that is suitable to run Java. The utilisation of GeoGebra's perfect visualisation functions for art education is one of the objectives of our research group. Its latest version, GeoGebra 5.0 includes 3D functionalities and is ideally suitable for digital creation in space. (Cf. the note on this functionality at http://wiki.geogebra.org/en/Release_Notes_GeoGebra_5.0) The software connects different representations of objects with their geometric display and algebraic description. Unlike designing on paper, the initial objects (points, straight lines) can be freely moved while the objects dependent upon them move along with them based on their

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geometrical connections. Thus, students practicing mental rotation can actually rotate a linear representation of a cube and see its shape changing according to the change of perspective in a discovery learning environment. The figure below shows how a spatial task can be solved through using the rotation functions of GeoGebra.

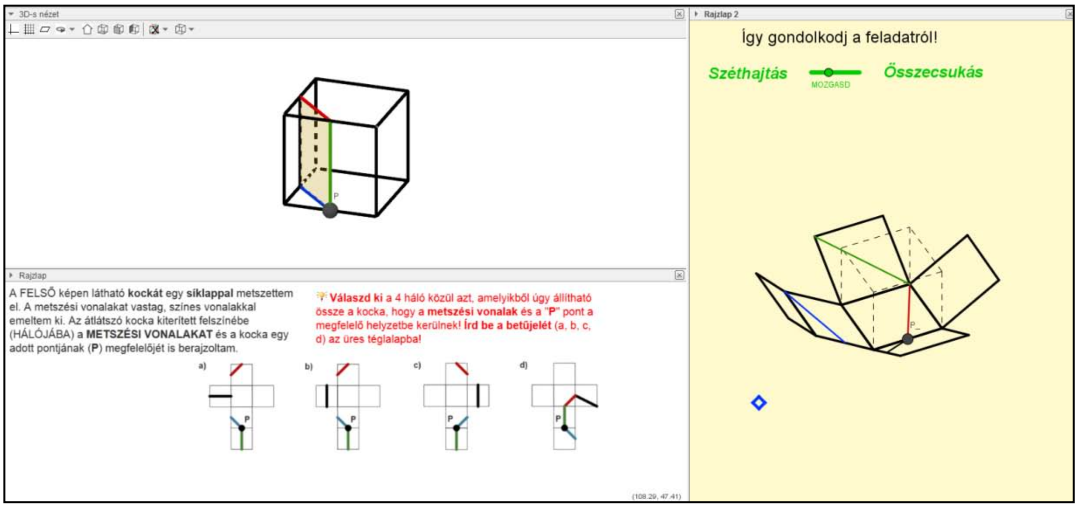

Figure 6. Sample spatial task in the GeoGebra software environment – On the right: help for the use of manipulating functions that facilitate the solution of the task through dynamic visualisation of the problem.

We compared task difficulty in a traditional paper based learning environment and in virtual space when objects can be moved and rotated. Student results were similar, but the dynamic digital environment was more suitable for demonstration and practice. Especially for girls, showing phases of a spatial manipulation makes it much easier to understand a spatial problem. In the current research phase we experiment with solutions to develop spatial skills through experimentation in digital space.

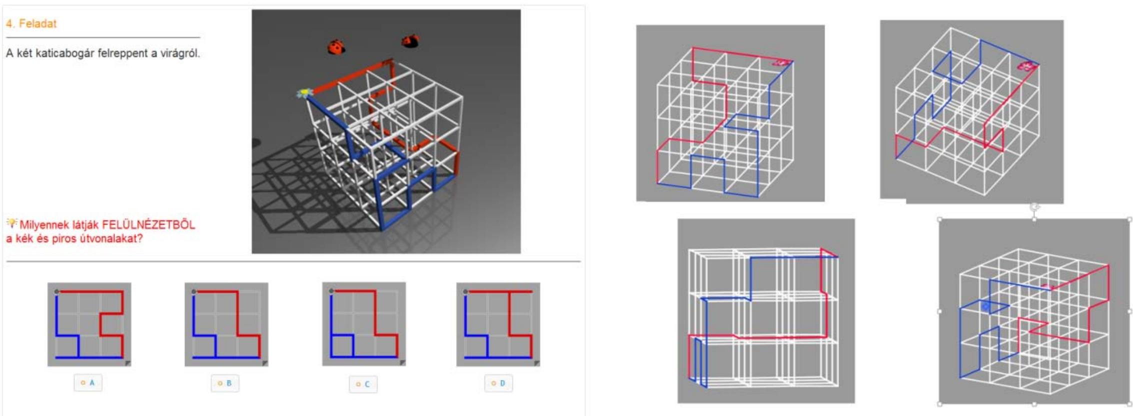

Figure 7. "Two ladybirds are flying above the labyrinth. Which bird's-eye view can they see? Choose one from among floor plans below!" On the left: the static version of the task. On the right: phases of movement using GeoGebra

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Further research

Between 2011 and 2015, a series of tests to assess visual skills of Hungarian 6-12-year-olds have been developed in three areas: spatial abilities, colour sensitivity and visual communication. Task response types in eDIA online testing environment include marking, colouring and moving images, entering text, joining text and picture or forming groups of items. Cognitive skills involved in perception, design and creation are targeted simultaneously, just like in real life. Visual skills are in focus, but other competences are also tested, revealing the interdisciplinary significance of art education. In its final form, the eDIA-system will monitor personal development, and offer tasks for individual skill enhancement based on previous results. Art teachers may thus design individualised teaching-learning processes that support talent development and caters for special need (like mental or psychomotor deficits) at the same time.

Phase two of our project will involve the correction of the system of tasks both for Spatial Abilities and Visual Culture, development of new items for Art Appreciation as well as Environmental Culture, and introduce them to a representative population of Hungarian 6-12-year olds. In parallel, a team of art teachers will use the tasks for development and diagnosis of gifts and deficits. Another major issue to research will be the comparison of creation with digital and traditional tools. Do we lose important aspects of creation and perception if we substitute paper and pencil with digital tools? What is the role of multimedia in the contemporary visual language of children? (As for adolescents, we have revealed its important impact, cf. Freedman, Hejnen, Kallio, Karpati & Papp, 2013). In all our future efforts, we will focus on a synergy of everyday visual language use in education. Our testing processes not only model, but also directly involve creative and design practices as we confront them in real life, interlinking assessment, education, and (self)improvement.

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THE IMPACT OF THE NATIONAL ICT PROGRAM ON THE SCHOOL FROM THE VIEWPOINT OF THE ADMINISTRATION – A CASE STUDY

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Abstract

This study investigated the process of implementing change in the school as reflected by the implementation of the National ICT Program in Israel. The study deals with the implementation of the ICT program in school and its purpose is to examine the various levels of change that occur in the school, from the viewpoint of the administration. The study is a case study, and was conducted using the qualitative method. The study took place in Israel and included in-depth semi-structured interviews with the administrative staff of the school: the principal, vice-principal, ICT coordinator, grade coordinator and teacher. The study results indicate the importance of implementing the ICT program on three levels: the administrative level, the teacher level and the pupil level.

Introduction

Changes in the educational system

Introducing change in the educational system on the school level is both hard and complicated, and should include comprehensive attention to internal and external school components (Berger, 1997). Fuchs (1995) the essence of educational change must be clear, built well, suitable for the needs of the population of the institution and familiar to the educational staff, in addition, in order to create a change in the school there must first be a change in the mind of the one who is performing the change – the teacher. In addition the staff must feel the need for change (Berger, 1997). Studies have proven that changes that meet the educational needs are in fact adopted and succeed. The feeling that change is necessary is a very important condition for the change to be successful (Sieber, 1981). The transition from a known situation to a new unknown situation is a change that requires new behavioural patterns. Various studies have shown that difficulties exist in the process of behavioural change. Due to the natural tendency of man to preserve the status quo and prevent any undermining of his self-image that he acquired in the past, man develops a fear of the unknown that he sees as a threat, a reaction that can become a hindrance to the change process (Goodlad, Klein & Novotney, 1973)

The literature that deals with implementing change in the educational system examines the innovation process from various perspectives, for example: the organizational perspective – how does the organization prepare for the change in its structural and operational program (Sharan & Hertz-Lazerovich, 1978; Fuchs, 1995) the teacher's perspective – how do the teachers deal with the demand to change, and what are their reaction patterns to this demand (Lacey, 1977; Katz, 1959) the school administration's perspective – how does the administration operate to implement the idea in the school community (Fuchs, 1995; Chen & Edi, 1995) The personal relationship perspective – what is the dynamics that occur between members of the staff at each level that will bring to success or failure of the change (Sharan & Shachar, 1990). In addition, one can find in the literature a distinction between external variables (outside of the school) and internal ones (within the school) that affect the implementation of the change (Oz, 2000; Fuchs, 1995).

Technological innovation

The integration of the computer into all aspects of life teaches us that the schools of the future will become more and more computerized and the implementation of technological innovation in the classroom will be an integral part of the teaching, learning and training process (Halverson & Smith, 2010; Selwyn, 2010). In addition, ICT creates changes that demand a response from the educational system, to cope and even to change (Solomon, 2000; Fullan, 2001). Technological information and communication are the most relevant for the primary processes in teaching and instruction and present catalyst for changes in the educational system, and as a means of equipping the future citizen with the tools that are necessary for living in an information society (Nachmias, Myoduser, Baruch & Zozovski, 2011). The researchers (Myadosar, Nachmias, Farkash & Tubin, 2003) defined three phases of innovation, that create a gradual and continuous sequence: the implementation phase, the transition phase and the transformation phase, the assumption is that each phase is more advanced than the previous one.

The National Computerization Program

The Israeli national ICT program (also called *Adapting the Educational System to the 21st Century*) is a program that was formulated in Israel by the Ministry of Education to promote pedagogy and learning in the school using ICT and its implementation in the curriculum. The Science and Technology Department of the Ministry of Education built a long term program which was presented to the Knesset Educational Committee in April 2010. The program is a multi-year plan which was implemented gradually, starting in the peripheral areas of the country. The program is based on a computerized model of innovative pedagogy (Information and Communication Technology – ICT). The goal is to implement the best pedagogy on a systematic level in the school while teaching 21st century skills to the pupils (Ministry of Education, 2011).

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The purpose of the study

The purpose of the study is to examine the process of implementing changes in the school as it is reflected in the application of the ICT program. The study examined the all levels in the school: the administrative staff, teachers and students, from the point of view of the administrative staff of the school.

Method

The research method and the interviewees

The study was conducted using the qualitative method and the paradigm of constructivist interpretation. Eight staff members from several elementary schools in Israel participated in the study. All the staff members participated in the administration of their schools. In addition, the selected interviewees had more than four years of experience in administration and were familiar with the situation before and after the integration of computers in the schools.

The process and research tools

The research tools were semi-structured in-depth interviews. The interviewees were asked questions relating to the implementation of the computer in education, such as: ICT tools, the method of implementation in teaching and the difficulties involved in its implementation. The interviews were between one hour and one and a half hours in length. The interviews were recorded and transcribed and were analyzed using Content Analysis where material is divided into content categories according to their similarity. The final stage is drawing conclusions according to the various categories.

Findings

Analysis of the interviews showed that there was a change in the school following implementation of the program.

This change was felt on several different levels: administrative, teacher and pupil.

The Administrative level

The research findings indicate that the principal is the significant figure in the implementation process of the program. The importance that the principal places on the aims of the program influences the amount of activity on behalf of the subject and on the extent of change it achieves in the teachers. It also emerged that the principal and the administrative staff have discretion how to activate the program in their school and allows for a certain amount of school autonomy in the implementation process.

The teacher level

The research clearly showed a change in the teaching process that was expressed by the teacher rethinking his teaching methods. The change is dependent upon the teacher, according to his knowledge and motivational level. The need for using discretion was emphasized along with the need for rethinking the old methods of teaching. It was also found that the program resulted in an advancement of team work, sharing learning materials and cooperation between the teachers. A subject that was brought up by the interviewees as a suggestion how to improve the program was to increase pedagogical guidance such as training programs and continued professional development as a tool for improving ICT instruction.

The pupil level

From the findings it can be said that the ICT program in school improves the pupil's learning experience and raises the motivation of the pupil. In addition, the program broadens the pupil's knowledge and allows for adaptive teaching. The ICT program narrows the gap between the media that is familiar to the pupil from home and the media found at school. Implementation of the program carries with it a message to the schools and may contribute to improving the teaching process. This work can contribute in various aspects to improving implementation of the program in the school and its successful implementation

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DEVELOPING AN IRISH PROFESSIONAL DEVELOPMENT FRAMEWORK FOR TEACHING AND LEARNING, IN THE CHANGING HIGHER EDUCATION LEARNING ENVIRONMENT

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Introduction to the development of the framework

The context of higher education is changing. The learning environment in which staff are working is in a state of flux as it responds to new socio-economic and political drivers, including the accelerated development of the digital world. In order to be responsive to this change, staff need to be adaptive and to continuously develop new knowledge, skills and attitudes for their own and their students' learning environment. As a consequence of this, there has been much focus internationally on the development of new flexible frameworks for staff professional development (PD). There have been many international drivers for the development of these frameworks, for example, the European Commission Report (2013) and the European Standard and Guidelines (2015).

Most professional development frameworks for teaching incorporate the wider definition of professional development, inclusive of formal, informal and non-formal settings. "Although learning often takes place within formal settings and designated environments, a great deal of valuable learning also occurs either deliberately or informally in everyday life. Policy makers in OECD countries have become increasingly aware that non-formal and informal learning represents a rich source of human capital" (OECD, 2010).

In Ireland, there have also been many drivers (i.e. DES, 2011; HEA, 2014) to support the development of a national framework that both prepares staff for their own changing learning context and is inclusive of a wider understanding of professional development. Therefore, in response to this, the National Forum for the Enhancement of Teaching and Learning (National Forum) carried out a series of focused primary and secondary research to develop a national professional development framework that would recognise, enhance, inform and support staff in a changing learning environment.

In 2015, the National Forum carried out an extensive nation-wide consultation process, following earlier review of international professional development frameworks (National Forum, 2015a) and an exploration of Irish accredited (National Forum, 2015b) and non-accredited activity (Kenny et al., 2015). As part of the consultation process, participants were asked to read the results of this initial research (hereafter called the 'consultation document', i.e. National Forum 2015a). 40 written response submissions were received from Irish higher education institutions, organisations (such as student union bodies, AHEAD), networks and individuals. In addition, there were 20 institutional face-to-face consultations (group discussions with staff/students). For different perspectives, seven interview-style meetings were held with professional bodies to learn from their experiences and approaches to PD. The details of the sample and the consultation research methodology are available in National Forum (2016a, pp.19-23).

The data from the interview notes, written submissions and group-discussion notes were analysed using a thematic analysis approach (Braun & Clarke, 2006). The themes emerging can be broadly presented under the following areas and inform the structure of this paper:

- The sector's understanding of the concept of professional development;
- Importance of work-based learning and other contexts;
- Underlying values and principles of the framework;
- Flexibility to the diverse staff and their changing roles over time;
- Key elements/domains for inclusion in a framework.

The sector's understanding of the concept of professional development

The extensive consultation process and other parallel activities of the National Forum have contributed to an emerging understanding of what is meant by the term *Professional Development* in the Irish context. The original *consultation document* had presented definitions, a spectrum of professional development activities and some suggested some models for its implementation (National Forum, 2015a). For example, the *consultation document* presented Dall'Alba and Sandberg's (2006, p384) definition of professional development as encompassing "formal courses and programs in professional education and to the formal and informal development of professional skill that occur in the work place". It also presented Kennedy's (2014) spectrum of Continuous Professional Development (CPD) models that moved from transmission to transitional to transformative approaches. The participants in the consultation process highlighted the value of moving towards either a transitional or transformative approach to CPD, with occasions for some transmission approaches.

There was a strong view in the consultation that accredited programmes of study were a key component of professional development activities. Many re-emphasised the European Commission's report (2013) *Improving the Quality of Teaching and Learning in Europe's' Higher Education Institutions*, that highlights that by 2020 all staff should receive certified pedagogical training. However, the participants also emphasised the value and volume of non-accredited activities that occur outside of the more structured formal sessions/events (National Forum, 2015a). These were identified as collaborative and unstructured non-accredited activities and an emerging framework should also value these types of activities (See Table 1).

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Table 1: Typology of accredited and non-accredited professional development activities (National Forum, 2015a, 2016b)

Non-Accredited			
1. Collaborative Non-accredited (non-formal)	2. Unstructured Non-accredited (non-formal)	3. Structured Non-accredited (informal)	4. Accredited (formal)
Learning from these activities comes from their collaborative nature. May stem from an individual's will or need to learn. It is fulfilled through the collaborative often, dialogic process.	These activities are independently led by the individual. Engagement is driven by the individual's needs/interests. Individuals source the materials themselves.	These are externally organised activities (by an institution, network, disciplinary membership body). They are typically facilitated and have identified learning objectives.	Accredited programmes of study (ECTs or other international credits)
Examples			
Conversations with colleagues, sharing research at a conference, peer review of teaching	Reading articles, following social media, watching video tutorials, keeping a reflective teaching journal/portfolio, preparing an article for publication	Workshops, seminars, MOOCs, summer schools. Working on an industry or other teaching/learning related project	Professional Certificate, Graduate Diploma, Masters, PhD in: Teaching and Learning; eLearning; Leadership in Education; Education Policy, etc.

The consultation questions emphasised that the framework needed to inform and emphasise good teaching that supports an impact on student learning. However, what emerged both from the consultation and the investigation of the literature is that, in addition, as teaching is evolving the "the scholarship of teaching is important" (as noted by participant 32, i.e. ID 32). The term *scholarship* of teaching grew from the earlier work of Boyer (1997) and was later elaborated on by Schulman (1999) and Glassick (2000). Saiful Bahri et al. (2013, p3) note that "a scholarly teacher selects the teaching method that has the best chance of helping students achieve the learning objective". This, they note, differs to the *scholarship of teaching* which, in addition, requires that staff draw upon resources and contribute to best practices in the field (Simpson et al., 2007; Saiful Bahri et al., 2013).

A helpful articulation of this term came from Shulman, who stated that for a work to be considered the scholarship of teaching: It must be made public; it must be available for peer review and critique according to accepted standards; it must be able to be reproduced and built on by other scholars (Glassick, 2000; Schulman, 1999).

Therefore, it was evident in this consultation that the framework needed to *reimagine* and give examples of what is understood by the *scholarship* of teaching and learning. A first draft of the framework has attempted to initiate a dialogue on scholarship and presents some initial

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examples of different forms of scholarship as they relate to professional development (National Forum, 2016b; p.22). Scholarship, for example, can be: staff discussing their teaching with colleagues; having discussions on a peer observation; presentations on teaching; developing teaching resources; researching into teaching and learning and disseminating these in peer reviewed journals. The scholarship of teaching and learning contributes to the "evidence-base of teaching and learning", a phrase that was reiterated by many in the consultation process. The students involved in the consultation process also emphasised the importance of teaching having an evidence-base. There is a growing interest in the scholarship of teaching in the sector, identified in the non-accredited (Kenny et al., 2015) and accredited reports (National Forum, 2015b). Given its emphasis, there is a need to articulate the "scholarship of teaching and learning" in the new framework for professional development.

Importance of wider context and professional practice learning

There was a continued reference in the consultation feedback to the importance of the context of professional practice, in particular the immediate work or day-to-day teaching and learning practices. Very recent literature (Reich et al., 2015) has also emphasised this idea and it links with the framework's *authentic* value (see next section). There was some criticism from participants in the consultation of professional development approaches that *only focused* on events that happen outside of the work practice context, i.e. workshops, accredited programmes. There was a strong message by many respondents that professional development is most valuable as a practice-based activity that also happens *on the job*, i.e. in professional practice. In addition, where staff intended to seek some accreditation for this type of activity, they emphasised the importance of a more formalised system to recognise prior learning (RPL). It was felt that this was currently being done nationally on a more case-by-case basis (National Forum, 2015b).

Some of the respondents who were familiar with the literature also mentioned the importance of the communities of practices approaches (Lave & Wenger, 1991), advocating the *collaborative* non-accredited (or accredited) activities (see Table 1) and supporting the underlying *collaborative* value mentioned in the next section. Some referred to the common break of professional development into formal (i.e. accredited), informal (structured non-accredited) and non-formal learning (unstructured and collaborative non-accredited) (OECD, 2010).

It was reported that many of the models presented in the *consultation document* did not seem to capture the socio-cultural view of learning, where community and collaboration are engaged to at different levels. Nor did the models place emphasis on the socio-political, physical and economic contexts that staff need to respond to, for example, changing student populations, resources, economic drivers, internationalisation, physical environment, etc. A dynamic framework is needed to "fit into the landscape" (ID 13). Therefore, the new framework should represent the individual pathways in practice and the wider context. Based on this feedback, the National Forum devised a conceptual model for the framework that

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positions the individual staff member in the middle of the process in the wider context of their changing professional practice (National Forum, 2016a).

Underlying values of the framework

There was strong support in the consultation for having a "values-driven framework" (ID 25), a transparent set of values underlying the framework. Values have been described as "the moral principles and beliefs or accepted standards of a person or social group". A value system is a "set of values according to which people, a society, or organization regulate their behaviour". The respondents highlighted that there was a need for a set of values around the framework itself, but also around the student experience and the importance of acknowledging the individual staff's set of personal and professional values. This is in keeping with some of the professional development frameworks explored as part of the consultation process, for example, the Teaching Council of Ireland's emerging framework. Many of the values that underpin the framework, align in particular with Kennedy's (2005) transformative CPD model (National Forum, 2015a; p.4).

The framework should value *inclusivity.* There was a strong recognition that there was a wide range of staff and, indeed some senior students, who contributed to teaching, learning and scholarship in higher education. It was considered to be imperative that the framework was accessible and inclusive to this wider group who teach in higher education i.e. academic staff, librarians, education technologists/developers, teaching assistants. Many highlighted the need to support the large growing group of part-time teachers who are key contributors to the student learning experience and who may be linked with more than one institution. The framework should allow for different pathways for different staff specialism and changing work contexts. It should be sensitive to changes in staff's roles and responsibilities over their careers, for example, one person noted that "research supervision is teaching". In addition, the framework should support a range of different professional learning opportunities and be applicable to staff at all levels and stages of their careers.

There was an acknowledgement that the framework should encourage *learner-centeredness,* in that it should be driven by the values, needs and motivations of the individual staff learner, i.e. internally driven (Kennedy, 2014). It should emphasise the importance of the "self" in learning. Professional development should strongly align with individual's teaching practice and attempt to be transformative of staff's knowledge and skills. Reflective practice was noted by many as a key lever for interrogating and transforming individual teaching practices over time and contexts. An extension of this concept of (staff) learner-centeredness was that of a student-centred approach to teaching. The framework should support innovative and creative teaching and learning approaches which aim to improve student engagement and empowerment in their learning. There were therefore two learners referred to in this value, staff as a learner and the student as a learner.

The framework, although focused around the individual staff learner, should encourage *collaboration.* It should encourage social learning that is key to learning in the work context

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and supported by many learning theories. It should encourage staff peer dialogue and support the mentoring of other staff. Although there was a strong emphasis on the role of the individual's institution, the framework should also build on the existing inter-institutional activity for a more efficient and collaborative approach to professional development activities. There was a strong support for the development and recognition of communities of practice that enhance professional learning in local, disciplinary or cross-disciplinary contexts.

The framework should have demonstrable *authenticity,* in that it should be relevant to the individual within their discipline and to the institution(s) involved in their professional development. It should not be a *tick-box approach* and should be manageable in the time available. It was also emphasised that it should be credible nationally and internationally, therefore it should be research-informed, linking with best practices in professional development. For it to be authentic, the framework should be reviewed and the change over time, where appropriate. This would suggest a phased development, piloting and review of the framework over a period of time.

These values should guide the processes used by individuals and institutions to recognise, inform, enhance and sustain professional development, acknowledging the varied approaches required in the different contexts in higher education

Flexibility to the diverse staff and their changing roles over time

Many of the respondents (for example, ID 9 and 11) highlighted the need for teaching staff to be in a cycle of evidence-based reflection and supporting change in practices over the life-long learning process (a spiral model), that was flexible. One respondent (ID 31) highlighted that the teacher should be viewed as an 'adaptive expert' (Bransford et al., 2005). They highlighted that adaptive capacity is a dynamic process that allows for ambiguity and complexity in a time of continuous change, referring to the work of Staber and Sydow (2002). Others participants referred to action research models of change or Temperly's (2011) work from post-primary which emphasises an evidence-based professional learning cycle (Victoria State Government, n.d.). The Pharmaceutical Society of Ireland and the Irish Association of Social Workers both emphasised the importance in their PD framework of reflection and peer dialogue, which was supported by evidence-based outcomes. The individual staff pathways, the *spirals* in the model should represent the changing and diverse roles of those in the higher education sector (see National Forum, 2016a for conceptual model).

Many mentioned the developmental aspect of a person's career and how it was important that any framework should take into account their early, middle and later careers. The novice to expert language had mixed reactions from those in the consultation process. Some professional Frameworks, such as the UK Professional Standards Framework for Teaching and Support Learning and the Irish Computer Society, link in with the concept of either Fellows or their current academic professional titles. However, if the new Irish framework is to be inclusive of different professional groups this approach may not be suitable. The first draft of the framework presents these learning phases as Tyro, Practitioner, Mentor, and

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Leader (National Forum, 2016b). This progression, however, is not presented as a linear approach as, for example, although some may be Leaders in their later careers they may be new to an area such as educational technology, i.e. a Tyro in this context. Therefore, there may always be elements in a career that require staff to up-skill or revisit, similar to the layers in an onion which is inclusive of earlier levels (see National Forum 2016a for conceptual model).

Key elements/domains for inclusion in the framework

Most professional development frameworks identify overarching domains (or elements) that assist in the articulation of the key areas for consideration in professional development. Based on the consultation process by the National Forum, five domains have been identified that represent some of the key areas in teaching, learning and scholarship and a first iteration of the indicators in these domains are highlighted on the National Forum's first draft of the framework (2016b).

The first domain is that of *Personal Development: The Self.* This represents the intrinsic individuality that the person brings to their teaching. It makes transparent the importance of the personal values of the individual, it underpins the human interaction needed for teaching. Personal values have been identified in the literature and in the consultation process as important to the teaching process. An additional element to this domain is the increasing recognised role that positive and negative emotions play in teaching, i.e. confidence, anxiety, anger (Sutton & Wheatley, 2003). "Therefore, the emotional aspects of teaching should be dealt with during pedagogical training, alongside theoretical and practical information concerning teaching and learning" (Postareff & Lindblom-Ylänne, 2011, p810)

The next domain, *Professional Identity, Values and Development,* emphasises the importance of the professional identity of the individual learner. Based on their professional identity and its associated roles and responsibilities, the person develops and self-evaluates their actions plans. This domain also includes the scholarship of teaching and learning, including critical reflection on teaching, gathering and sharing of evidence of their teaching approaches.

The *Professional Communication and Dialogue* domain emphasises the importance of the skill of communication and the dialogue with others in the professional learning process. This also links with the framework's value of collaboration.

The *Professional Knowledge and Skills* domain addresses the design and implementation of their teaching and learning approaches. An extension of this domain, but separated out given its national strategic significance, is the person's *Professional and Personal Digital Capacity.* This domain will draw on themes used in National Forum's funded project on digital skills development, i.e. All Aboard (http://allaboardhe.org).

Feedback from the consultation process highlighted that these domains need to be clearly described and expanded for different phases in the careers of staff in higher education, i.e. the tyro, practitioner, mentor, leader. The descriptors and elements need to be useful in different

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context. It was also emphasised that they should not be overly prescriptive and should emphasise the life-long learning concept.

Conclusion

Based on an initial thematic analysis, the following were the key findings:

- The sector was in favour of a more transformative professional development approach, which acknowledged the spectrum of accredited and structured/unstructured/ collaborative non-accredited activity.
- There was a strong view that professional learning happens, not only happens in structured events, but within the context of professional practice. In addition, the wider institutional and socio-political context strongly influences professional development.
- There was a need for values-driven framework. Based on the consultation process, the values underpinning the framework were that it should be encourage inclusivity, authenticity, scholarship, learner-centeredness and collaboration.
- The model for the framework should represent the changing pathways of the diverse staff involved in teaching in higher education. Staff should engage in a cycle of reflection, based on evidence-based practice, as they move through the different phases of their professional development.
- Five key overarching domains were identified for inclusion in the framework: Personal Development: Self; Professional Identity, Values and Development; Professional Communication and Dialogue; Professional Knowledge and Skills; and Professional and Personal Digital Capacity.
- The institutions have a primary role to play in their staff's professional development, based on national framework

This paper sets out some of the key themes that emerged from a national consultation on an emerging professional development approach in Ireland. It emphasises the importance of being responsive to the complexity and changing context of practice. Reich et al. (2015, p.139) maintained that in developing a professional development framework:

> *"..The challenge is to work out ways of capturing and representing learning in more dynamic ways (as described above) and to develop CPE/CPL frameworks that acknowledge this complexity and messiness of professional practice; the collective nature of learning and practice and the dynamic and ever-changing organisational work environment–as well as appreciating the professional association and employing organisation's position."*

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CURRENT SITUATION OF E-LEARNING IN HIGHER EDUCATION: A CASE STUDY

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Introduction

E-learning is gaining popularity year by year, with almost all large universities providing online programmes and courses nowadays. Due to high youth population in Turkey, there is a huge demand for e-Learning, especially from disadvantaged groups who also need to work whilst studying and are therefore unable to attend traditional on-campus education for several reasons. As a result, universities are providing different programmes to counter these demands. On the other side, and for similar reasons, having high numbers of on-campus students, universities suffer from inadequate resources in terms of numbers of both instructors and physical classrooms. Consequently, at many universities, mandatory courses delivered to all enrolled students are also being transformed to be provided online.

Programmes and delivery methods: e-learning at Ankara University

Ankara University offers various online programmes supported through a Distance Education Centre. These programmes offer a variety of vocational, undergraduate, and graduate degrees. The vocational programmes include computer programming, medical documentation, insurance and banking, tourism and catering services, and a judicial services support programme. The university provides an online BSc. Religious Studies degree programme for undergraduate students. MSc/MA graduate degree programmes in Human Relations, Journalism, Health Management, and Social Services are also offered. In addition, some formal training courses offered to students of all departments, namely Information and Communication Technologies, Foreign Languages, and Turkish Language courses are also offered through e-Learning.

Ankara University Distance Education Centre supports this e-Learning process by providing learning management systems, virtual classrooms, interactive content and communication tools. The university uses Moodle as the learning management system, one commercial, and one open-source programme as virtual class software. Content development is supported by a national product (Etudio), besides some other commercial and open-source tools. Multimedia studio is also used to create video-based content.

Assessment of e-learning at Ankara University

The Distance Education Centre decided to monitor the process of e-Learning in 2011, and periodically administers two scales each year in order to reveal e-Readiness and satisfaction. Measuring e-Readiness is important since motivation and preparedness directly affects how students benefit from using ICT (Dada, 2006; Aydin & Tasci, 2005; Okinda, 2014), and entry characteristics of students also affect satisfaction (Yukselturk, 2009). Measuring the satisfaction of online students is also important since it provides detailed information on other aspects of the process such as instructors, content, learning environment, and assessment (Secreto & Pamulaklakin, 2015; Kuo, Walker, Belland & Schroder, 2013; Cole, Shelley & Swartz, 2014).

Based on these facts, this research study is conducted to reveal the readiness and satisfaction levels of online students and to investigate possible differences between students' grade, gender, and status (formal learners or online).

Research methodology

This research study was based on a survey methodology in order to reveal different aspects of various programmes. e-Readiness was administered at the beginning of the semester, whereas e-Satisfaction was administered at the end. This research study seeks answers to the following research questions:

1. To what extent were distance education students and formal learners ready for their online courses?
2. To what extent were distance education students and formal learners satisfied with their online courses?
3. Are there any differences in terms of e-Readiness and e-Satisfaction between distance education students and formal learners?

Sample

The aim of this study was to investigate readiness and satisfaction of both distance education students and formal learners who registered for online courses. All registered students from different levels, who were two-year or four-year undergraduate students or graduate (masters) students, formed the participants of this study. The population for this study comprised of 10,262 students enrolled in various distance education programmes or online courses at a state university in Turkey. The demographic is shown in Table 1.

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Table 5: Student demographics

Type of Student	Number of Students		Gender		Marital Status	
	Total	Participants	Male	Female	Single	Married
Vocational School	2,129	867	405	462	639	228
BSc./BA	1,293	895	250	645	180	715
MSc./MA	514	329	145	184	133	196
Formal learners (enrolled for online courses)	13,000	8,171	3,144	5,027	7,842	329

In this data, 2,091 students are registered to fully online programmes and can be classified as distance learners, whereas 8,171 are only registered to several online courses and are therefore known as formal (classroom) learners. More than half of both distance and formal learners are female. Marital status changes according to programme, and those married are mostly enrolled in BSc/BA programmes.

Data collection instruments

Two scales, namely the *e-Readiness Scale* and *e-Satisfaction Scale*, originally developed by one of the researchers, were used to collect data for this study. The reliability coefficient for the e-readiness scale ranged between .77 and .80, whereas for the e-satisfaction survey, the values were between .91 and .96, which implies reliability of both the scales (Gülbahar, 2012).

The e-Readiness scale was aimed to reveal the participants' level of readiness for e-learning before the start of the course (Gülbahar, 2012). The scale is formed as a 5-point, Likert-type scale with 26 items, plus one open-ended question. The scale has five factors which are individual properties, ICT competencies, access to technology, motivation and attitude, and factors that affect success.

The e-Satisfaction scale was aimed to identify participants' level of satisfaction about the e-learning process and is administered at the end of the semester (Gülbahar, 2012). This scale is also a 5-point, Likert-type form, having 29 items plus one open-ended question. The scale has four factors, which are communication and usability, teaching process, instructional content, and interaction and evaluation.

Data analysis

For data analysis, SPSS version 17.0 statistical analysis software was used for qualitative analysis. One-way ANOVA, Scheffe, and descriptive statistics were conducted on actual datasets. Before starting the analysis, all invalid data was deleted from the datasets.

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Findings

e-Readiness levels

Data for the 10,262 students was analysed in order to determine their e-readiness according to grade levels. The results showed that ICT competencies have a higher effect on participants' readiness for vocational, MSc/MA and formal students. In addition, success factors have a bigger effect on the readiness of BSc/BA students. Results of the descriptive analysis of data from the e-Readiness scale for each dimension are presented in Table 2.

Table 2: e-Readiness results

	Vocational students (N= 867)		BSc/BA students (N= 895)		MSc/MA Students (N= 329)		Formal Students (N= 8171)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Individual Properties	3.22	0.91	2.87	0.88	3.39	0.79	2.93	1.05
ICT Competencies	4.20	0.93	3.71	0.99	4.21	0.85	3.67	0.99
Access to Technology	3.87	1.03	3.76	1.05	4.09	0.87	3.28	1.18
Motivation & Attitude	3.71	0.94	3.42	0.85	3.84	0.85	3.23	1.01
Factors that affects success	4.11	0.90	3.87	0.86	4.14	0.85	3.51	0.95
Total	3.90	0.72	3.58	0.71	3.99	0.71	3.39	0.79

It is obvious that the majority of participants feel competent about using computers and the internet in terms of information searching, communicating through online tools, and using social media for educational purposes. Also, as a general view, the data shows that MSc/MA students have a higher degree of readiness than vocational, BSc/BA, or formal students. Owing to the fact that MSc/MA students have already completed their undergraduate degree, their general educational background may be the cause of that result.

e-Satisfaction levels

The 4,792 students' data were analysed in order to determine their e-satisfaction according to grade level. The results showed that instructional content has a higher effect on participants' readiness for vocational, BSc/BA and MSc/MA students. As for formal students, the results showed that communication and usability factor is more effective on satisfaction. The results of the descriptive analysis of the data from the e-Satisfaction scale for each dimension is presented in Table 3.

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Table 3: e-Satisfaction results

	Vocational School Students (N= 568)		BSc./BA Students (N= 631)		MSc./MA Students (N= 214)		Formal Students (N= 3,779)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Communication and Usability	3.65	0.93	3.49	0.91	3.50	0.87	3.46	1.02
Teaching Process	3.59	0.90	3.31	0.89	3.46	0.89	3.34	0.96
Instructional Content	3.68	1.00	3.50	0.94	3.66	0.92	3.38	1.06
Interaction and Evaluation	3.50	0.98	3.26	0.93	3.32	0.91	3.21	0.98
Total	3.50	0.83	3.32	0.79	3.43	0.77	3.33	0.87

According to the descriptive analysis, it is seen that the majority of participants feel well-guided about the instruction process, involved in a good online learning climate, and have a common idea about instructors' expertise in their area. Those items are the most important factors which affect the participants' satisfaction in terms of vocational, BSc./BA, and MSc./MA students, in other words for distance learners. The situation differs for formal students, where communication and usability has more importance for their satisfaction levels. This difference for formal students could be explained as a result of them having already attended face-to-face courses and then expecting the same interactive environment regarding online courses.

Comparison of programmes

According to One Way ANOVA analysis, the data shows significant differences between graduation levels [$F_{(2\text{-}2088)}$= 61.45]. With the aim of determining the source of these differences, Scheffe test was conducted, and the results showed that MSc/MA students (X=3.99) and vocational school students (X=3.90) have a higher e-readiness than that of BSc/BA students (X=3.58).

Table 4: Distance education students' e-readiness

Source of Variance	Sum of Squares	df	Mean Square	F	p	Significant Difference
Between Groups	63.617	2	31.809	61.446	.000	Vocational - BSc./BA MSc./MA - BSc./BA
Within Groups	1,080.896	2,088	.518			
Total	1,144.514	2,090				

MSc/MA students have a higher graduation degree than the BSc/BA and vocational school students, so they may be more ready for e-learning and their expectations higher because of these past experiences. Similar to the situation described for MSc/MA students, there is also a significant difference between vocational school students and BSc/BA students. The age differences may be a reason for this difference too, as vocational school students are younger than BSc/BA students, and their ICT competencies higher than other students, and thereby more ready for e-learning.

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For determining the differences on e-satisfaction levels, One Way ANOVA analysis was reran. The data showed a significant difference between graduation levels [$F_{(2\text{-}1410)}$= 7.13]. With the aim of determining the source of these differences, Scheffe test was conducted, and the results showed that vocational school students (X=3.50) are more satisfied than BSc/BA students (X=3.32).

Table 5: Distance education students' e-satisfaction

Source of Variance	Sum of Squares	df	Mean Square	F	p	Significant Difference
Between Groups	9.261	2	4.630	7.127	.001	Vocational - BSc./BA
Within Groups	916.063	1,410	.650			
Total	925.324	1,412				

This difference between vocational school and BSc/BA students can be a result of the characteristics of their schools. Vocational school students have been inclined to use ICT tools in comparison with BSc/BA students, which may make them more comfortable, and feel more confident during the e-learning process. When considering item scores, it can be seen that vocational school students are more willing to use communication tools and different interaction channels. Also, instructional content has the highest score among all satisfaction factors, which can be explained by their content area. BSc/BA students have taken more verbal courses, and vocational school students have taken mainly mathematics courses during their education. It can be said therefore, that the efficiency of instructional process can be affected by the construct of courses and programmes.

Discussion and conclusion

In this research study, it was aimed to provide a bigger picture of how distance and formal learners perceive their e-Learning experiences, both before and after the teaching-learning process. Findings revealed varied results for different groups. These differences have many reasons such as age level, subject field, instructional content provided, ICT competencies, communication and interaction expectancies, and assessment preferences. It is difficult for formal learners to keep up with both face-to-face and online courses at the same time, especially when times for the courses offered do not match students' expectations. It is also difficult for lifelong learners to handle e-Learning in addition to their work and family responsibilities. In light of these results, these findings show that besides known variables and obstacles, there are many options for future implementations in order to tackle existing and potential problems.

Administrators monitor students' preferences and try to present what they really need and expect. Of course, it is not an easy task to address each students' needs with such a large student population. However, thanks to technology, year on year the features of learning management systems are increasing in a way that is making these systems more suitable for meeting students' needs. Many tools and plugins are provided for different purposes like assessment, gamification, social analysis, interaction and collaboration, which are all factors that affect student satisfaction (Sun, Tsai, Finger, Chen & Yeh, 2008). So, at least for supporting communication and interaction processes, we now have many more options than

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before. On the other hand, there are again many tools for producing really high quality and interactive multimedia content for students. Together, these opportunities enhance the usability of the learning management system by supporting student engagement throughout the course. In addition to technological tools, instructional design and technical support issues are very important for student engagement. Access to efficient technical support can decrease stress, and vivid multimedia learning instruction can help enhance student participation (Liaw, Huang & Chen, 2007; Concannon, Flynn & Campbell, 2005). Also, it's highly important that instructor's demonstrate the correct level of expertise and attitude during teaching-learning activities as the instructor component directly affects academic achievement (Paechter, Maier & Macher, 2009). In terms of professional development, institutions should provide regular training for e-learning instructors.

In summary, as educators we are trying our level best for those who need rather than choose, to receive their education, or part thereof, via e-Learning. More ubiquitous learners are requesting e-Learning than ever before, and we now know what they expect and how best to satisfy them in their e-Learning experience. Hence, based on the results, the training of instructors, enhancing the quality of content, and enriching existing materials and resources should be the first steps taken in providing a better e-Learning experience for our students and to further strengthen our e-Learning implementation.

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THE TECHNOLOGICAL FOUNDATION OF DISRUPTIVE EDUCATION AT UNED

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The future of universities is uncertain to put it mildly. Analysts argue that over the next 10 to 20 years up to 50% of universities will end up in bankruptcy or just be forced to close. If this is the case for traditional or face-to-face (henceforth F2F) universities then it is arguably more so for distance-learning universities, since they not only face the challenges of a changing educational marketplace but also ever stronger competition from their F2F counterparts offering online services. So the question needs to be asked about how the former can address this problem.

At UNED we have always applied *dogfooding* to our educational model. We are fast approaching our 50th anniversary, and what we have learnt over the decades is the value of applying the results of the research of our academics on the methodological and technological bases of ODE/ODL to our educational services, and as such, to our core business model. The authors argue, based upon what they perceive in their working context, that the competitive advantage that distance universities have over F2F ones is precisely the intrinsic value of the innovative long-tail of contributions that can come from our staff who are on the bleeding-edge of the distance educational process. This provides us with a unique opportunity not only to participate in the change, but more specifically, take a leading role in it! However, it is not always easy incorporating these results.

Technology is clearly a facilitator here, it is the wheels on the bus, the glue in the model and the verb in the sentence. Without it, our fundamental capacity to provide *disruptive educational services*, and at the same time remain agile and be able to adapt to a constantly changing educational context, without affecting the integrity of our service infrastructure, would be seriously limited. If new revenue streams do not appear as a result of what we are doing, then we should question its value. A key feature here is the changing relationship of students to education, and therefore our institution, moving from one-time degree seekers to committed life-long learners, as the need arises. Some corporations are even beginning to question the value of university degrees as opposed to shorter more focussed courses.

What we have learnt at UNED over the years is that technological support for new methodological ODE/ODL contexts can never be selected/developed for its individual intrinsic value but as part of an overall institutional strategy that potentiates the long-tail of institutional member participation, be it from lecturers, tutors, or support staff. If this cannot be guaranteed, then we run the risk of today's solution becoming tomorrow's problem. The irony for most institutions is that innovation in their educational services has little or no effect on their business model. A case will be made here for the technological foundations of disruptive education using examples from UNED.

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THE TU DELFT ONLINE LEARNING EXPERIENCE: FROM THEORY TO PRACTICE

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Introduction

In 2014 TU Delft started an innovation programme to educate the world and improve quality of education based on online learning. The programme included open (OpenCourseWare and MOOCs) and online (Professional Education, Bachelor and Master) courses. Lecturers of TU Delft have shared their knowledge in MOOCs with more than 750,000 learners around the world. Next to the open courses, more than 800 learners enrolled in our online courses.

Adopting new instructional strategies based on online learning elements has had a very positive impact in TU Delft's overall education, benefiting traditional on campus education and contributing to the changing need in educating engineers (Kamp, 2014). Naturally, blended learning has arisen on campus, where online learning materials are reused in a flipped classroom approach with very positive results: higher completion rates, higher average grade, more flexibility for students to interact with the course material and more flexibility for teachers in choosing which elements to include in the interactive classroom sessions (van Valkenburg, 2015).

The development of TU Delft online courses is based on the Online Learning Experience (OLE), a pedagogical model that supports the development of our courses and strives for increasing quality. The creation of the OLE was an important step for TU Delft, contributing to the development of online courses in a more systematic and consistent way, guiding all course development teams through the realisation of several shared educational principles.

Last year, when we presented the OLE at the 2015 EDEN Conference in Barcelona, we were still at an early stage of its development, collecting fundamental background to support it and feedback from online learning experts. Although we only had a collection of ideas translated into 8 principles, it was clear that the model needed to be flexible in order to accommodate many educational scenarios that coexist among TU Delft's Faculties, but with a clear and useful purpose to help improve the quality of our online education (Jorge, Dopper & van Valkenburg, 2015). This paper describes how the OLE is applied in practice.

The main goal of the OLE is to improve the quality of our online education by setting course design and development principles to support course teams. At the same time, the OLE can be used as a tool to promote reflection before the course starts to set expectations, and in the end to evaluate and plan improvements for the next run. In the next sections we'll describe the OLE in both ways – as course design principles (guidelines) and as a tool (the radar graph).

The OLE course design principles

The OLE holds 8 principles to support course teams in the design and development of online courses. The model was elaborated based on the foundations established by distance learning experts (Moore, 1991; Keegan, 1996; Palloff & Pratt, 1999; Garrison, 2000; Peters, 2000; Anderson, 2003; Garrison & Anderson, 2003; Salmon, 2011; Salmon, 2013; Bates, 2015) and the know-how of the TU Delft Online Learning Course Development Team.

Flexible (in time, space & content)

- Course schedule considers learner's needs in terms of workload and deadlines. All important dates are communicated in the first week of the course or even before its start.
- Course is based on asynchronous communication, with synchronous moments (when existent) clearly announced in the beginning of the course, taking in account learner's needs.
- Learners can explore the course content in a non-linear way and complete the required tasks, managing their time individually according to the course schedule. Learning units have a minimum length of 1 week.
- Learners can choose their learning path relevant to their learning needs. This involves being able to choose educational resources, learning methods and subjects to study, offering opportunities for personalization while reaching the learning outcomes.

Diverse (activities, resources & assessment)

- Learners carry out different types of learning activities throughout the course, both individual and collaborative.
- Learners are assessed using a variety of forms of assessment, both formative and summative, aligned with the learning objectives and activities.
- Course provides a diversity of high quality educational resources (video, audio, text, hypertext, images, and graphics) throughout the course to enhance learners' knowledge.

Inclusive (accessible, cultural & gender)

- Course provides educational resources in alternative formats to match different learner's needs.
- Learners can access the course and operate effectively using the most common devices and download educational resources for offline learning or reuse.

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- Learners can easily navigate in the course. Course is well structured, has a consistent user interface with common styles, formats and layouts.
- Course content is presented using a gender inclusive and multicultural approach.

Supportive (guidance & feedback)

- Course team is approachable, welcoming, responsive and conscious of their diverse learners' needs, creating a positive atmosphere to learn. Course team monitors progress on a regular basis and contacts learners to support and motivate.
- Course team facilitates, monitors and encourages participation, active discussion and peer learning contributing to the development of a learning community.
- Learners are provided with timely expert advice on questions and individual feedback on assignments within a stated response time, helping them advance their competence.
- Learners receive timely regular and relevant updates from the course team (e.g. announcements, reminders, Q&As).

Interactive (learner – learner/teacher/content)

- Learning activities ensure learner-learner, learner-course team and/or learner-content interactions to promote active engagement.
- Independent educational resources provide learners with automatic feedback through self-assessment activities (e.g. quizzes, tests), enabling learners to expand and test their knowledge and understanding.
- Learners are encouraged to share experiences, discuss, support, challenge and learn from each other, leading to the development of a learning community that builds effective and relevant knowledge.
- Online social networking opportunities are provided in order to build and support a learning community (e.g. social forum, social networking sites).

Active (learning by doing)

- Activities are engaging, interesting and relevant, promoting learning by doing.
- Learners are required to actively contribute in the learning activities.
- Learners are provided with clear instructions that explain the learning activities in detail (learning objectives, tasks, timeframe, expected outputs and assessment).
- The amount of time spent on activities is greater than the time spent passively reading/watching.
- Learning activities drive the usage of resources in order to develop competences rather than delivering new information to the learner.

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Contextual (real world situations & problems)

- Learning objectives help learners transfer knowledge into practice, including the application of technical and scientific knowledge within their own context.
- Learners are challenged with problem solving activities based on real life (authentic) examples and case studies, whether provided by the staff or shared by the learners as part of an activity or discussion.
- Real world examples (including from different national contexts) and best-practices are presented in the educational resources to make it more relevant for learners.

Innovative (new tools, strategies & insights)

- Learners experience an innovative learning method or technology (e.g. virtual lab, simulator) that contributes to the learning outcomes and has a positive impact on the course (e.g. pass rates, satisfaction, motivation).
- Learners have access to the newest insights in research provided by top academic teachers, opening up their possibilities to develop ideas, establish new synergies and connections.

The OLE as a tool: the radar graph

The OLE radar graph is a tool to promote reflection and critical thinking, offering the opportunity to improve an online course. The exercise should be done by the course team (teachers and teaching assistants) and support staff (e-learning developer and product manager) before the course starts, in order to anticipate opportunities for improvement and at the same time establish expectations, taking into account several aspects (e.g. the number of learners, their needs and the specificities of the course).

In order to generate these course insights to be analysed and discussed during the course development process, the OLE guidelines are used as criteria, rated on a scale from 0 (not at all/inexistent) to 5 (exemplary/excellent). The results (%) are then plotted on a radar graph to get a visual insight of the course. Feedback from all players involved in the teaching & learning process is collected after the course runs, including student's data (collected from surveys and extracted from the learning management system), to compare and draw reflective conclusions, contributing to an improved version of the next run of the course.

When using the tool, it should be understood that different types of courses origin different types of patterns revealed in the graph. Although some courses may have strong similarities, especially when they are part of a same programme, each course takes into account the learners needs in order to develop the most effective teaching and learning experience for that situation.

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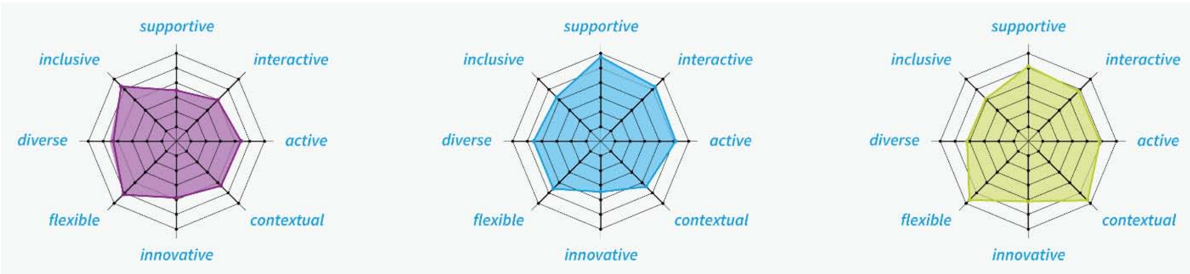
In order to test the tool, insights from teachers and support staff (eLearning developers, instructional designers, product managers, managers) involved in the conception, design and development of online courses were gathered in an online learning seminar hold at the TU Delft in October 2015. The input received from the participants for the different types of courses offered by TU Delft allowed us to create a visual representation of each, plotted on a radar graph, as shown in Figure 1.



MOOC (n=15) | Online Course (n=11) | Professional Education (n=17)

Figure 1. The OLE radar graph representation of 3 types of courses: MOOC, Online Course (Bachelor/Master) & Professional Education

In these examples we see that different types of courses originate different radar graphs. While an online course should be highly supportive with learner-teacher interactions, it's not expected that a MOOC reaches this level considering the massive number of participants. MOOCs can be seen as flexible and inclusive courses open to anyone in the world. In the Professional Education course radar graph we see that contextual is the highest ranked principle, considering that learners expect to work on real world cases and apply what they learn directly into their practice. Flexibility is also an important principle in these types of courses, considering the needs of this specific target group, namely working professionals with a full-time day job and sometimes a busy family life. Although these examples don't apply to real courses, it revealed itself as an interesting exercise to gather perspectives regarding different types of courses.

Applying the OLE in the course development process

The OLE is integrated in the different phases of the Education Quality Cycle of TU Delft Online Learning, an important component to ensure quality when developing and running a course. In each phase it has a different function, as illustrated in the yellow bar in figure 2.

1. Introduction – the OLE is presented to all course teams during the Onboarding day, a one day event to get all participants familiar with the basics of online learning and to draft a course plan with the support of the e-learning developers.
2. Guidelines – the OLE is continuously used as guidelines during the course development process, with the support of the e-learning developer.
3. Reflection – the OLE is used as a tool to draw a first radar graph of the course in order to improve it before it runs and establish expectations; this exercise is done by the course team and support staff.

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4. Evaluation – the OLE is used again as a tool, now also with student's data, collected using a post survey and combined in an evaluation report that contributes to an improved edition of the course.

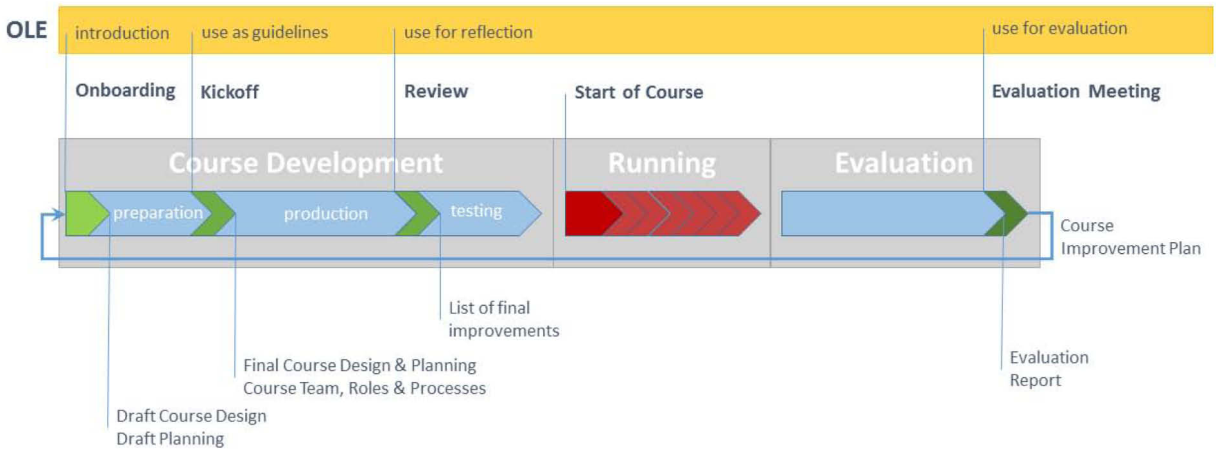

Figure 2. Education Quality Cycle of TU Delft Online Learning

Included in this cycle are multiple surveys for the learners: pre, mid and post survey. The pre surveys give us input on what to focus in the OLE, helping us design and run online courses that fit student's needs. The post surveys are to evaluate the choices that were made in the OLE, combined in an evaluation report in order to improve the next edition of the course, as shown previously.

Present and further developments

The OLE guidelines are already an important instrument used by course teams and support staff for the design and development of TU Delft online courses. Many fruitful discussions have raised concerning the OLE, bringing up important concepts to consider and creating awareness regarding online learning practices and education in general. Putting the tool into practice in a reflective and insightful way has shown similar perspectives when thinking about different types of courses. The next step is to implement the OLE in a more systematic way.

In 2016 all courses will be designed, reviewed and evaluated using the OLE. During the evaluation meeting, after the course has run, the radar graph will be completed based on the experiences of the course team and on the information from the student surveys. In this way, we'll collect a large amount of radar graphs which can lead to valuable information about the online learning experience of participants in various types of TU Delft courses. This can help in improving TU Delft courses for next runs, gives us insight on important aspects for the different course types, which can help again in sharpening the OLE principles itself.

In conclusion, the purpose of the OLE is not to judge but to support the course design & development process, to rise reflection and critical thinking regarding online learning. We hope that the OLE will lead to the development of better online courses offered by TU Delft, more insight in online learning experiences in different course types and continuous feedback on the OLE itself.

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THE ASSESSMENT PROCESS AS A CORNERSTONE OF QUALITY ASSURANCE IN HIGHER EDUCATION: THE UOC CASE

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Introduction

The accreditation system of Higher Education degrees is currently being shaken by new types of learning resources and educational courses. Internet has long since opened a new scenario for teaching and learning processes which are promoting rethinking of, and new insights about quality assurance. Universities are analysing the impact of new net-based course formats and approaches such as MOOCs, and their corresponding certification. Blended or fully online learning environments are being extended across educational institutions. This requires, then, that the educational system ensure the quality of these new learning processes.

Although teaching and learning processes are being analysed, the impact of the e-assessment has not yet been satisfactorily scrutinized. The assessment process should be considered as the core element for credibility and accreditation of Higher Educational institutions. The assessment process is the road map for accrediting and ensuring learner competences. Universities are nowadays certifying degrees based on quantitative and qualitative scores, without considering assessment and ICT opportunities as factors that can contribute towards the evolution our system.

According to the Bologna competence-centred model, the assessment process will be the challenge with respect to previous stages of the European educational system. The Information and Communication Technologies that teachers are employing in their daily tasks are enhancing learning methodologies; nonetheless, new approaches need to be considered from the perspective of e-assessment.

The Assessment Process as a Quality Accreditation

In this paper we propose to analyse the assessment process as a quality accreditation tool based on two main premises: the educational and technological ones. Both should be the indicators for assuring and increasing the credibility and quality of the educational system.

On the one hand, a formative and continuous assessment model is the most suitable approach to analyze competences acquired through learning activities or examinations. On the other hand, technology can help us improve the assessment processes by introducing new resources and tools from other industry sectors. We believe that ICTs can make the educational system more reliable and credible as their use can improve the authentication and authorship of learning acquired over the net. This is why we believe that the e-assessment process is a cornerstone of European Higher Education.

The Universitat Oberta de Catalunya (UOC) is an Internet-based university with a virtual campus which offers the entire span of higher education degrees – Bachelor's, Master's and Doctorates – fully online. The UOC was born 20 years ago with the mission of providing people with lifelong learning and education opportunities. The institution's mission is to help individuals meet their specific and ongoing learning needs, and to provide them with full access to knowledge, overcoming the usual time and location constraints. Our learners are disseminated across the world. The main goal of our case study is to define and to analyse an e-assessment system, focusing on the process of learner's authentication and activities' authorship in online and blended learning environments. The conducted pilots reduced some face-to-face examinations and allowed for an increase in our on-line learning activities based on a continuous assessment model, while ensuring the quality of the assessment process itself.

During two academic courses several methods and techniques were applied in two pilot studies involving 200 students in a real environment. The first pilot proposed a continuous assessment model with new tools and resources in learning activities. These tools added some new techniques to capture learner data. They were based on learners' authentication elements (such as learners' identity, personal digital certificates and facial recognition) and learners' authorship identification through activities (textual forensic analysis, plagiarism from the net, keystroke patterns…). The second pilot included the previous models and techniques in an e-assessment prototype for performing activities and final examinations. To sum up, we analysed whether our learners are who they claim to be and if the activities were indeed executed by them in a virtual learning environment.

Preliminary Results

Results from our study can be analysed from three different points of view: the student's, the teacher's and the university's. From the students' point of view, preliminary results indicate that they feel more comfortable with a fully online assessment instead of moving to physical university premises. For that reason, they feel comfortable in providing the personal data needed for personal authentication (photograph, voice recording and a keystroke record). Furthermore, the verification techniques included in the pilot reinforce the student's trust in the rigour of the assessment system and, subsequently, in the degree certification.

Teachers, on the other hand, realize that in order to reduce the face-to-face processes of assessment, learning activities and assignments should be carefully designed with this goal in mind with the help of adequate ICT tools. Furthermore, teachers also notice that the possibility to collect evidence and additional information on the academic progression of their learners allow them to assess their improvement ways even better than available in face-to-face scenarios, where some of this information cannot be obtained.

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From the university point of view, adding student authentication tools and authoring analysis to an e-assessment process improves the quality of the assessment and allows the university to truly verify that competences are acquired by the learners being awarded academic credentials through activities. The tested e-assessment system provides increased credibility to the university and greater recognition from both the educational community and society.

UOC wants to share with EDEN audience its study cases and their results, which are the basis to a Horizon 2020 proposal on e-assessment quality lead by the UOC, and jointly presented with 18 partners from European universities, quality agencies, research centres and businesses. The proposal has been selected for funding, thus underscoring the importance that this issues holds in HE. The awarded project is called Towards an *Adaptive Trust-based e-assessment System for Learning* (TeSLA)

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TELL ME YOUR STORY: A MOOC MODEL FOR REDUCING BIAS THROUGH PERSONALIZING CULTURAL NARRATIVES IN SMALL, COLLABORATIVE, MULTICULTURAL STUDENT GROUPS

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Introduction

Once literary studies in the western world focused on a dominant literary culture and highlighted the classics. With the breakup of the literary canon, more space has been given to women's literature and literature written by minorities. Nonetheless, with the mass migration to Europe and shift in world cultures, many immigrant and minority students feel alienated from the culture in which they live and very little literature is taught in the schools and colleges that gives prominence to those students' native cultural backgrounds.

The MOOC setting that we have developed exposes students to diverse multicultural literature and leads them to respond to and share ideas regarding the literature and in particular cultural issues. Based on the TEC Model, the MOOC incorporates work in small multicultural groups where students experience collaborative discussions and shared projects on literary and cultural issues.

The TEC Model

The TEC Model (Hoter, Shonfeld, & Ganayem, 2012), developed by the TEC Center in Israel, provides the stages to build trust in online environments. Adapted from the Contact Hypothesis (Allport, 1954; Pettigrew & Tropp 2008), students from different and diverse cultural backgrounds study together in small multicultural collaborative groups. The TEC model is applicable to all countries; however it was developed in Israel to specifically bring together different groups within the population. Israel is a very segregated society, in which Jewish religious and secular students as well as Arab students often study in separate educational frameworks and have limited points of social contact. This segregation, coupled with the political situation, leads to fear and prejudice between the different sectors of society. Academic courses given by the TEC centre bring students from different backgrounds together, often for the first time. The students study in small multicultural groups and only meet F2F once they have already worked together collaboratively and formed bonds online with their classmates from other cultures. Collaboration on all levels is the key to the TEC Model: from management, to team teaching and student interaction. Each of the small group assignments performed by the students requires a higher level of collaboration, thus gradually building trust and group cohesion between the group members (Walther, Hoter, Ganayem, & Shonfeld, 2015).

Course Description

The course *Minority Literature Written in English* is one of the MOOCS offered by the TEC Centre. The course participants consist of 100 student teachers from five teaching colleges throughout Israel. These colleges are drawn from the different sectors of the Israeli population. There are Arab colleges and Jewish colleges and mixed colleges, but even though some of the participating colleges have a mixed student body, those colleges do not generally facilitate mutual discussions nor engage in encouraging activities that will foster more contact and communication between students coming from different communities.

In the planning stage of the course, the lecturers meet in person for a two day getaway, and work collaboratively in person and online throughout the year. The collaborative aspect extends to the lecturers as well, who model for the students positive multicultural cooperation: the workload, both in terms of preparation and delivery of the online sessions, is divided and the lecturers contribute their own areas of expertise. Each lecturer takes responsibility as faculty facilitator for small groups of six students comprised of participants from all of the teaching colleges in the course, including Arabs, Jews, secular and religious students from different religions and cultures in Israeli society.

The literature studied includes short stories and poems dealing with the topics: S*piritual Journeys, Home, Family, Love and Marriage, Identity, Intergenerational Relations and Food*. Most of the texts read in the course are written by Arab and Jewish writers and relate to issues that draw on the various geographic, cultural, and religious backgrounds of our students (Forsman, 2012). The assignments encourage students to share their own experiences, knowledge, and anecdotes with other group members, either orally in breakout rooms during the lesson, or in writing as group assignments. This creates an authentic learning experience in English as a foreign language and allows for task-based written and oral exercises to be performed collaboratively by students from different backgrounds and beliefs. The collaborative strategies and understanding and appreciation of the other, which are critical in Israeli society and indeed the world, are invaluable tools that these student teachers can transfer to their own future students in the classroom (Maoz, 2011; Salomon, 2008).

Unlike the other courses taught through the TEC Centre that use Hebrew as their language of instruction, this course is taught in English, which enables students to engage in a peace related learning process through the use of a common, neutral global language. For some students English is their native language, while for others it is the second or third language they have studied. However, all students in the course are proficient in English since they are themselves studying to become English teachers. The use of English in the course accordingly diffuses misunderstandings or power struggles which could arise if Hebrew were the main language of instruction (Kolikant & Pollack, 2009).

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Research

The students were required to keep a reflective journal throughout the course as well as participate in forums and social media discussions carried out in the small multicultural groups. (Clarke, 2004; Humphreys, 2005) We have examined this material in order to understand the heuristic process the students undergo in this course, their collaboration with students from other cultures, as well as how the course influenced them. The poster will present the model we have developed for reducing bias through personalizing cultural narratives in small collaborative multi-cultural groups together with the analysis of the students' reflective journals and participation in the social media.

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THE MASSIVE OPEN ONLINE COURSE ON PALLIATIVE CARE ENABLES COMMUNICATION IN SIX LANGUAGES

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Abstract

Mobility provides people with opportunities both in terms of their personal growth and their professional development by studying or working in an international work environment. However, personal well-being depends on the person's language competence in the new context. The Medlang Massive Open Online Course (MOOC), created through Med&Lang project (2014-1-RO01-KA203-002940), aims at meeting the growing language needs of students, doctors or nurses who live in a very mobile environment. The target groups cover a wide range from medical lecturers, language teachers, medical students to nurses, doctors and lay people accidentally involved in palliative care. Palliative care is a human approach addressing patients with serious illnesses in the last phase of their life. It relies on spiritual and psychological support as well as relief from pain and is meant to improve the quality of life for both patients and their families. Palliative care is provided by an interdisciplinary team made up of physicians, nurses, and other health professionals. The open digital educational resources created in the field of palliative care are based on the development of innovative guidelines on standardized fundamental medical manoeuvres and basic clinical language and communication skills for supporting the learning/teaching processes (http://www.medlang.eu).

It is expected that this project will contribute to both the standardisation of the medical palliative protocols at European level and also in terms of the communication necessary to perform these procedures. It is also expected that through this process the competitiveness of the European medical higher education will increase as potential international students interested in medical studies in Europe will get a glimpse of the modern way in which medicine is being taught and practiced in European hospitals and universities.

European Context and the Med&Lang Project

The MOOC on palliative care follows a CLIL Programme. CLIL (Content and Language Integrated Learning) involves teaching the content of a subject (palliative care) through the medium of a language other than the student's mother tongue. Thus students acquire knowledge and understanding about palliative care protocols while at the same time improving their language competences related to this content. This also means that language teaching/ learning does not follow the traditional course from simple to complex; rather, language elements are introduced whenever they are related to the content. CLIL balances content and language learning in such a way that the second language is learnt in meaningful situations just as the first language is (Coyle, 2006). Student empowerment is encouraged by engaging them in their own learning process; students are involved in experiences which are applicable in the real world and are stimulated to use technology meaningfully. Learning is also consolidated through sharing communication and student knowledge construction. The intercultural knowledge and medical practice specific in a diversity of cultural contexts becomes relevant and shared among the MOOC users. Students' participation in the MOOC forum is another illustration of student empowerment. They are invited to reflect on their contributions, share knowledge, opinions, and experiences and provide constructive feedback. Students have a voice which is taken into account for course planning, design or strategies.

The materials address students who are at an intermediate level. However, a lower language level student may also benefit from the course according to Marcia Foresee Drumhiller and Paula J. Schwanenflugel's findings (2013). International medical students are adults who can take advantage of their conceptual and topic knowledge. Marcia Foresee Drumhiller and Paula J. Schwanenflugel started from the fact that first language vocabulary predicts second language vocabulary acquisition and advocated the role of topic knowledge and expertise in the acquisition of a second language.

Specific-purpose language learners have certain advantages over other learners. To begin with, they already know the field-related vocabulary in their mother tongue, vocabulary which is often similar to the target language and they also have topic knowledge that will facilitate their understanding of the unknown words. Thus medical students have already created highly organized concepts in their long-term memory. As conceptual knowledge is not stored separately in the two languages it goes without saying that it is easily retrievable in either language. This will no doubt accelerate second language vocabulary learning. Moreover, they may already know one or two languages and therefore have experience in language learning and useful skills, which they can bring to the acquisition of another language (Drumhiller & Schwanenflugel, 2013).

Main Components of the MOOC

The elaboration of the protocols consensually agreed at the level of the European partnership contributes to the integration of specialists from the medical field in the European labour market.

After thorough research 20 protocols have been selected and their structure standardized as follows: a clinical manoeuvre/ procedure (e.g. Heimlich manoeuvre, Valsalva manoeuvre, etc.), a clinical situation (doctor – patient communication and procedure implementation), scientific medical evidence and the steps to be followed in the protocol. The steps combine skills of communication (initiating the conversation, identifying the patient, etc.), technical aspects (positioning, geometry of the performed movements, timing, etc.), assessment and

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counselling, in the logical order in which they are carried out. The protocols help students get familiar with and practise clinical skills required in real practice situations, better connect the knowledge and skills learned during the academic training with the reality found in everyday medical practice, support and develop skills for medical communication (situations, gestures, speech, vocabulary, interaction, culture-specific behaviours and adaptation of the medical act to cultural issues) and create support for autonomous learning practice skills for medical students, nurses, or any person who may be experiencing situations of medical intervention (Colibaba, Petris, & Gheorghiu, 2015).

The protocol situations have been filmed and 20 videos have been made. Videos capture simulation of medical manoeuvres, situational medical interventions accompanied by specific medical communications, diverse cultural contexts and links with curricular medical subjects taught in the host country language or in a lingua franca. The actors performing the protocols are teams of three students, each of them alternating in the role of: physician – performer of the protocol, patient – receiver of the protocol and evaluator of the protocol, who evaluates the procedures and communication in strict reference to the Guide of protocols agreed (ibid.).

When converting the videos into linguistic learning units the videos are considered in terms of the vocabulary, grammar structure, functions, and cultural elements present in the communicative situation. Each unit relies on the video and accompanies it with learning activities aiming at introducing, practising and consolidating the vocabulary, structures, functions and cultural components present in each protocol. The envisaged activities cover all language skills: listening, reading, speaking and writing. The MOOC aims at striking a balance between the four skills. A wide variety of online activities have been selected such as filling in, matching, true or false, ordering words in a sentence or paragraphs/ lines in a dialogue, multiple choice, word master (online completion exercises/ online hangman), correcting mistakes, organizing the vocabulary under the headings given, gapped text (a script from which some lines/ paragraphs have been removed and students have to reconstruct the text by putting the lines in the gaps), word search (students have to find the words in the box with the definitions given), games, etc. (Colibaba, 2015).

The MOOC is divided into 20 units and offers materials for learning the following languages: English, Dutch, Italian, Spanish, Romanian, and French. The development of each unit is based on a linguistic framework of the video processed from a variety of perspectives: linguistic/cultural/functional/communication.

The linguistic framework consists of five stages: Watch, Focus on vocabulary, Learn More, Think and Self-evaluation. The first stage is made up of two steps: step one prepares the student for the video by familiarising him/her with the topic and vocabulary. The next step requires the student to watch the video and check comprehension. The second and third stage introduces vocabulary and grammar structures related to the topic and also offers opportunities to practise them. The fourth stage focuses on speaking and writing activities stimulating students' exchange of ideas on cultural issues, critical thinking skills and creativity. In the last stage students answer a quiz based on the activity done and the

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knowledge gained throughout the unit. The following table contains examples taken from the unit on the urethro-vesical bladder catheterization procedure.

Table 6: A Linguistic Unit Framework

STAGES	Short description Ex. Topic: The urethro-vesical bladder catheterization procedure
I. Watch!	**1.Preparation** – familiarising students with the topic/vocabulary (matching, ordering ideas, fill in etc) **Ex**: Before you listen We suggest you do the following activity below before you watch and listen. Then watch the video and do the first task to check your understanding. Finally, practise some vocabulary and grammar. Match the words (1) with the descriptions (2) below. Drag and drop. 1. catheterization, bladder, catheter, to sting, drainage system, infection, fatigue 2. a) the use of or insertion of a catheter (as in or into the bladder, trachea, or heart) b) a distensible membranous sac that serves for the temporary retention of the urine, is situated in the pelvis in front of the rectum, receives the urine from the two ureters and discharges it at intervals into the urethra through an orifice closed by a sphincter. c) a tubular medical device for insertion into canals, vessels, passageways, or body cavities for diagnostic or therapeutic purposes (as to permit injection or withdrawal of fluids or to keep a passage open) d) to feel or cause a keen burning pain e) the act or process of drawing off fluids from a cavity or wound by means of suction or gravity f) an infective agent or material contaminated with an infective agent g) tiredness, the condition of being tired **2. Comprehension: Skill focus: Listening/Reading** Content: video of the protocol + Embedded multiple choice questions related to the comprehension of the text- who/ what/ where/ when/ why Types of activities: filling in, matching, true or false, ordering words in a sentence or paragraphs/ lines in a dialogue, multiple choice, extra words (there are 10 extra words in the transcript that learners have to find and delete, either before, while or after watching the video, jumbled dialogue (students reassemble the dialogue before, during or after listening); gapped text (script from which some lines/ paragraphs have been removed and students have to reconstruct the text by putting the lines in the gaps), jumbled text (download and cut up the transcript; ask students to reorganize the text into the correct order; students watch the video and check) **EX**.: Watch the video and put the sentences describing the stages of the rethro-vesical bladder catheterization in the order they are presented. 1. introductions/ general evaluation of the patient …helping patient to stay relaxed and calm …explaining the steps of the procedure …telling the patient what the doctor will do and what the procedure is about and why the doctor performs the procedure ...reassuring the patient that everything is ok even if they will feel some

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	discomfort …making recommendations … performing the procedure by introducing the Foley probe …letting the patient know when the procedure is over Click on the right answer to each question. 1. What is a Foley catheter? a. It is a thin tube that drains urine from the bladder. b. The Foley catheter acts as a drain to fill your bladder. 2. How do you have to wear the drainage bag? a. Always keep the drainage bag below your bladder (when you are lying, sitting or standing). b. Always keep the drainage bag above your bladder (when you are lying, sitting or standing). 3. When do you have to change or empty the drainage bag? a. Empty the drainage bags when they are half full. b. Empty the drainage bags when they are half full. 4. What do you have to do to stay healthy while wearing the drainage bag? a. Don't drink too much water. b. Check that your urine is healthy. It should be clear and yellow.
II. Focus on vocabulary	**Skill focus**: Reading (related to the topic of the video) **Vocabulary focus**: Introduction/ explanation/ practice + links to online exercises **Types of activities**: word master (online completion exercises/ online hangman), correcting mistakes, organizing the vocabulary under the headings given. **EX**.: Do you know the synonyms of the following common words? Click on the correct choice. empty- fill/ remove/ drain tiredness- fatigue/ depression/ disappointment drain- fill/dehydrate/empty reassure-comfort/ discourage/dissuade **EX**.: Fill in the gaps: watch the video again and complete the text with the words which best fit the gaps below. I will place a ………….. in the bladder so that you will directly empty your ……… in the medical containers specially designed for it from now on. It is a procedure that involves passing a flexible ……………through which you urinate. The technique is generally easy to perform. There won't be any cuts or bruises. This should not ………you at all. It is not painful either. It is very important that you are relaxed, calm while going through this ………... Please don't move your body and your legs as we will have to insert the ………….. without introducing any microbes.
III. Learn more	**Grammar and functions focus** (related to tehvideo): Introduction/ explanation/ practice + links to online grammar exercises **Types of activities**: filling in, matching, true or false, ordering words in a sentence or paragraphs/ lines in a dialogue, multiple choice, correcting mistakes, games. **EX**.: Study the grammar explanations and do the following exercise. Which verb form do you need to complete these sentences? Click on the

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	best choice: Ex: When did you start _____ journalism? to study study 1. We recommend ....this medicine. to take taking 2. The doctor recommended ....at least 2 liters of fluid every day. drinking to drink 3. At least daily, the genital area should be washed with soap and water, to prevent infection………………... from occurring to occur
IV. Think	**Skill focus: Writing / speaking** **Content**: Medicine/ culture issues related to the topic Writing: types of activities: filling in, matching, true or false, gapped text (script from which some lines/ paragraphs have been removed and students have to reconstruct the text by putting the lines in the gaps), expressing opinions in writing (guided, based on questions aimed at either personalizing or expanding the unit info with cultural elements. **Speaking**: (guided discussion based on questions aimed at either personalizing or expanding the unit info with cultural elements). a). asynchronous: audiobook(m); voice Thread; wiziQ; WhatsApp; b). synchronous: skype; viber **EX.: a. Speaking task** 1. Make a summary of the urethro-vesical bladder catheterization procedure, highlight its main steps, film yourself presenting the summary and upload your film. Ask your colleagues for feedback. 2. Make recommendations on how to use the drainage bags; film yourself making recommendations and upload them on the platform. Ask your colleagues for feedback. 3. Imagine a dialogue between a doctor and a patient who has to do a urethro-vesical bladder catheterization procedure; roleplay it with a colleague and upload your film on the platform. Ask your colleagues for feedback. **b. Writing task** Find a colleague; search the internet and your library and write a short paragraph on the differences between performing this procedure in male and female patients; upload your paragraph on the platform and ask your colleagues for feedback. What are the cultural issues related to the topic? Write a short paragraph with one of your colleagues and upload your paragraph on the platform; share your findings with your colleagues on the forum.
V. Self-evaluation TEST	**Online self-evaluation** (types of activities: filling in, matching, true or false, gapped text, etc.)

Each unit starts with an introductory video where the tutors familiarize the students with the topic, objectives, main outlines, activities, tasks and types of assessment of the unit.

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Each unit is accompanied by a vocabulary glossary and grammar explanations. The vocabulary glossary is made up of ten of the most important words from each unit. Students can access the word, its meanings in the target languages of the project, synonyms, antonyms, its pronunciation as well as the word in sentences. In designing each unit the following points have been considered: identification of vocabulary, structures, functions and cultural elements (language items related to the topic of each unit), selection of adequate activities to help students acquire the language items, creation of vocabulary glossaries, selection of grammar explanations and materials on cultural issues, selection of online activities, identification, selection and design of tasks for each activity, identification and selection of online evaluation devices for the activities, collection of activities to encourage students to contribute their experience and knowledge about cultural issues, development of worksheets on language items to help the language teachers use specialized content for trans-disciplinary CLIL teaching (Colibaba, 2015).

Conclusions

The strong point of the project is the creation of an MOOC – (Open Massive Online Course) for the palliative medical and linguistic fields. The MOOC improves learners' skills in palliative clinical manoeuvres and medical communication and intercultural skills; it also encourages learners to practise skills in simulation centres and promotes autonomous and collaborative learning; it provides open free resources available online for everybody interested in medical manoeuvres and medical communication skills. Due to the creation of the MOOC the project provides language teachers with an educational support for teaching languages for medical purposes. It also connects the language disciplines with the medical disciplines.

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TEACHING TO TEACHERS: A MOOC BASED HYBRID APPROACH

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Policy Matter: The National Plan for Digital School in Italy

The National Plan for Digital School (PNSD 2015) is one of the main components of *La Buona Scuola*, the national policy program to modernize the K-12 schools system in Italy. Born as a deliberative policy-making process, indeed la Buona Scuola has been bitterly contested because of its general aim to reinforce and responsibilize the school leadership, thus reducing the general sense of collegial participation in school and program management. On the other hand, however, the school system in Italy has never experienced such a level of bottom up participation, engagement and centrality in government policies, with a positive effect on allocated funds to reengineering education, renewal of school buildings and creation of new skills and pedagogies in teacher education. One billion Euro has been, in fact, allocated on the National Plan for Digital School in order to bring broadband and connectivity in any K-12 institution, to create a generation of tech savvy teachers, educational opportunities for all the field personnel, to elaborate and implement a consistent strategy for learning by doing, problem and lab-based teaching initiatives. Moreover, the national strategy aims at laying a common ground for basic skills both in teachers and learners, experimenting with new approaches and at the same time, inviting teachers to become researchers in their field. The need for repositioning education is well supported by some data: an inquiry by OCSE TALIS (2013) sees Italy on the first place for teachers training and educational needs in ICTs, the 36% out of teachers investigated declared to be not sufficiently prepared for technology-enhanced teaching against an average rate of 17%.

Considered as a central pillar of *La Buona Scuola*, the PNSD intends to propose a strategic vision about the 21st century education, using the digital not as a means but as a game-changer that is able to push the organizational change, to leverage education key resources (mainly human), to promote OER and professional skills development. In other words, to re-position the Italian education system on the global market. It seems to be a complete change of paradigm, at least so far.

Context Matter: When a Virtual Community Becomes Real

The theoretical background

Sakai-Miller (2015) encourages educators to get to the heart of 21st century teaching by asking themselves three questions about the lessons they're preparing: What? So what? Now what? According to Sakai-Miller, in order to empower students, we need to empower teacher first thus realizing a virtuous cycle to disrupt old paradigms and move the education forward. The pivotal key is to shift from the paradigm of acquiring knowledge to actually using it; bringing theoretical ideas into practice. To help teacher to uptake the innovation age challenge, we need to solve the digital isolation of all employers in the education field, thus transforming them into an active community that is able: "to foster collaboration in class, beyond class, and beyond school; to promote self expression, interactive communication, and three-dimensional communication through words, data, and graphics; encourage creativity by building creative confidence, and associational thinking and empathetic thinking skills; and boost critical thinking skills by supporting the iterative learning process and building questioning and experimentation skills" (Sakai-Miller, 2015). This approach has its roots into the theory of Alinsky's Community Organizing and, on the pedagogical side, into the Dewey's concept of Community of Inquiry. Then, both constructivist and connectivist ideas pave the way towards a deep interaction with the content and between people/needs/actions and beliefs in a more complex matrix of reciprocal interaction for the knowledge, that is more and more embedded within the social context (Siemens, 2005).

A MOOC on coding

Starting from this perspective described, the MOOC on Coding has deployed a hybrid approach where the virtual dimension, the onlineness, is articulated in synchronous and asynchronous activities throughout the use of the hangouts for living the experience (where the community of enrolled people interact with each other by commenting the video lecture in real time) while the Emma platform is used to re-arrange the lesson and its instructional design in a form of a loop. In this context, the Emma platform features works as an agile platform that does not deliver pills of knowledge but creates a social tissue around the teacher community involved.

Coding has been recognized as a fundamental discipline to be introduced at schools to develop computational thinking skills. The unprecedented success of the two main coding literacy campaigns launched in the last years (i.e., the Computer Science Education Week and Europe Code Week) was mainly due to three key factors: the availability of beginner-friendly playful online instruments to approach coding, the collective awareness on the importance of coding, and the passionate engagement of thousands of teachers worldwide who took advantage of such initiatives to bring coding into their classrooms. After this experience, we decided to exploit the Code Week approach in a MOOC format, experiencing the features of a brand new MOOC platform developed under a EU CIP program. The European Multiple MOOC Platform (Emma for short) has been considered, in fact, very attractive for its experimental nature as well as its multilingual and multicultural approach offering an agile and personalized method to both teaching and learning.

A hybrid approach

The MOOC has been organized as a hands-on experience course that is mainly based on live webinars and video tutorials illustrating how to organize coding activities using only freely accessible online resources. The aim of the MOOC was not to create new skills but to provide methods and instruments to introduce coding at school by creating awareness and this way

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change the mindset of in-service teachers. This approach allows them to learn the fundamental principles of coding together with their pupils and to apply computational thinking to any topic. Considered as a transversal skill, the objective of such a MOOC was to restore the centrality of the teacher in the Italian school system through a highly scalable process of teaching/learning among the diverse actors involved: coding ambassadors, teachers and digital animators, pupils as final users. In the following paragraphs, we will explore the dimension of the experience as well as the factors of success with empirical data on user profiles, previous learning experience as well completion rate. Due the concise format of this paper, the empirical testbed will be presented during the conference. While the concerning MOOC is still running at the moment (starting date: 25 January, duration 13 weeks), we can only add here that for now it seems very successful for both – the enrolment numbers (almost 4,500 people enrolled during the first launch week, and the number keep growing) and the participation rate (the first video lesson received 6,000 views in one day only, with over 1,500 simultaneous connections to the Emma platform), and thousands of immediate feedback and comments.

Social media channels contributed enormously in organizing and creating such a large community where thousands of teachers experienced a sense of community and belonging. The following chart presents some demographic data about the involved target. What appear to be extremely interesting is that only a few MOOC participants have previous experience in such a course and topic, while the majority of them come from primary schools. It is largely a self-selected target – reached by a very short communication campaign mainly organized through social media and blog posts – which appears to have emerged as a unified community of interest because of the special space of opportunity created by the policy program thanks to the launch of PNSD.

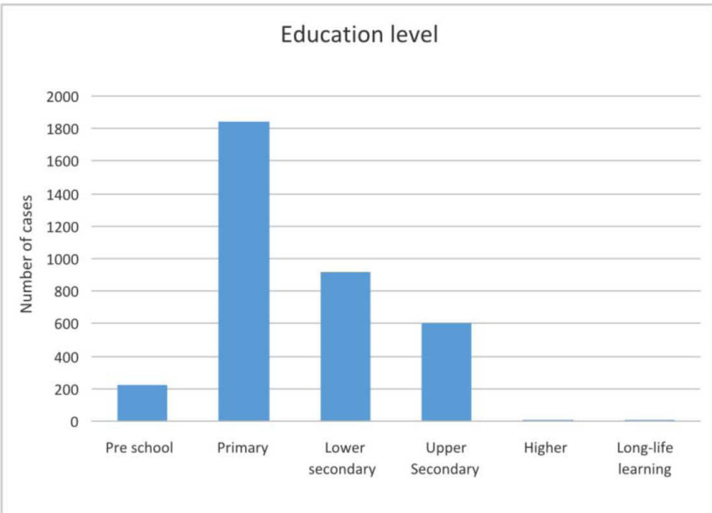

Figure 23. Teachers by type of school – Needs Analysis for the MOOC on Coding

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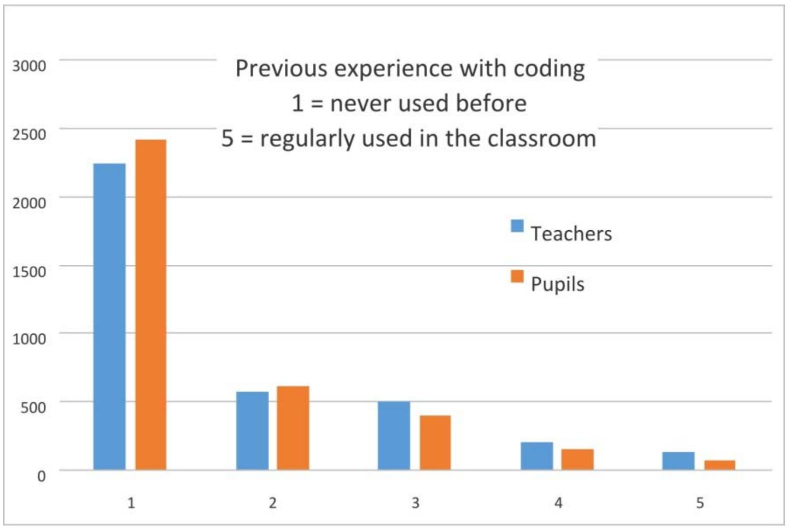

Figure 24. Previous experience with Coding

In this respect, education gained momentum and popularity with a non secondary effect. For our personal experience, in fact, it is the first time that the teacher role (recently under the pressure of a delegitimization force) is converted into an enabler factor, gaining centrality, legitimation and social value.

I'm here where You are – The teacher role in a hybrid environment

Common needs, self-recognition, peer-reflection, and empathy seem to be the keywords of a successful MOOC. This result seems to be counter-intuitive since the MOOC roots are deeply radicated in the ideas of openness and scaling up at a global level. Which, of course, are both brilliant ideas, that indeed do not exclude the possibility of scaling up education within specific communities.

Dewey has provided a framework for the model of community of inquiry and collaborative learning as predictors of learning processes and outcomes. Then the Community of Inquiry concept has been adapted to support a faculty engaged blended course redesign. Anderson, Rourke, Garrison and Archer (2001) using the Dewey's Community of Inquiry model, make references to the online environment and different online teaching presences stating that "the concept of teaching presence is constitutively defined as having three categories – design and organization, facilitating discourse, and direct instruction" (p.1). Few years later, Anderson (2004) organized these roles in a graphic model showing that deep and meaningful learning results when there are sufficient levels of three components but overlapping *presences* which he termed social, cognitive and teaching, as illustrated in the diagram below (p.273).

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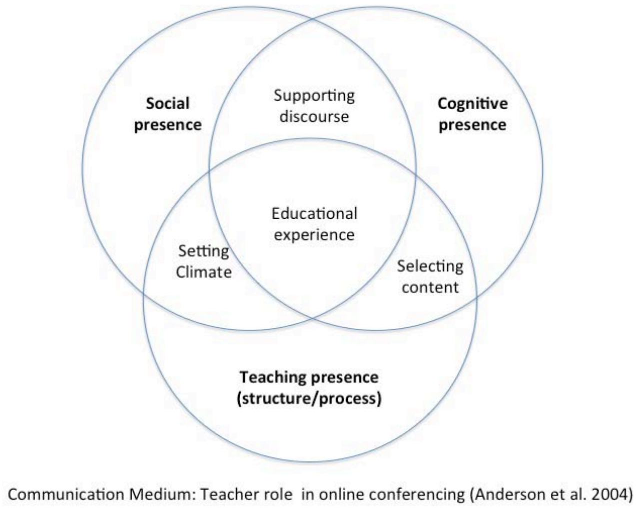

Figure 3.

The case of MOOC on Coding appears to fit perfectly with the concept of community of inquiry, with a relevant difference: participants are also teachers with a clear role within the society. So the MOOC teacher and participants share a common understanding of their mission in the world, a sole vision of the future education, and a clear objective to be reached all together. The similarity with the Alinsky model of community organizing is impressive. Here a self-selected community that is able to self-organize using itself at the same time as a medium and a message to enlarge the community, thus scaling up the benefits of becoming a whole in a bottom up constructivist and connectivist experience. This is probably the most valuable effect that empirical data – expected in the final release of this paper – will for sure demonstrate. As a preliminary conclusion, we can say that all participants to this experiment share the different spheres of the community of inquiry model with the same legitimation, populating all related spaces with their networking and knowledge sharing activities, supporting the teacher's discourse by creating new learning objects and setting a very positive climate.

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EMBEDDING MOOCS IN UNIVERSITY COURSES: EXPERIENCES AND LESSONS LEARNED

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Introduction

The focus so far on the discussion of effects of MOOCs on education in Europe, with associated opportunities and threats, has largely been on pedagogy and learning in a more abstract way rather than on more concrete effects, for example the opportunity to use MOOCs as a tool for professional development for teachers (Schuwer et al., 2015). The role of MOOCs can be an important one in this respect, not the least in the area of ICT in education where the need has been great for teachers all over the world. In this paper, we will describe the experiences of embedding MOOCs in a graduate course (NOK042F) on distance education at the University of Iceland (UI) School of Education in spring semester 2016. One purpose of this integration was to expose students to the opportunities involved before graduation so they could be more aware of what might be available for them in their future professional development. Also those experiences materials for critical analysis based on theories, research and pedagogical models in distance education as well as ideas for the design and development of online courses.

Background

Much of the literature about the impact of Massive Open Online Courses (MOOC) has been centred on the US context even if data showed a high percentage of MOOC participation in Europe and that in Europe public policy was driving MOOC institutional uptake (Jansen et al., 2015). Recently more research has centred on developments in Europe in this respect. As an example the European Association of Distance Teaching Universities (EADTU) hosted a conference “WOW! Europe embraces MOOCs” in Rome in last November where results from the HOME project (Higher Education Online: MOOCs the European way) were introduced as well as from other initiatives involving institutional MOOC strategies. One of the paper presented at the conference described such initiatives at the UI in Iceland (Jakobsdóttir, 2015).

In 2013 a workgroup at the UI examined the *MOOC landscape* at the time and recommended strategies for the university regarding development of blended learning and MOOCs (Hafsteinsson et al., 2013). The group gathered data about UI students’ experiences regarding MOOCs and the data indicated that many used open educational content and that some had explored foreign MOOCs and even completed MOOC courses. The recommendations by the workgroup included that each of the five schools of the UI would experiment with MOOC integration in selected courses. In 2014, this was explored in four courses with fairly good results (Jakobsdóttir, 2015). One of the courses involved was the above mentioned course on distance education (NOK042F), which is a graduate course with students mostly aiming to become teachers at the upper secondary or who already are teachers at that school level but aiming for a masters' degree or a teachers' licence. The course was not taught again this spring and it was decided to include again a project where students could participate in MOOCs and evaluate their experiences.

The project

In the spring semester 2016, there were 23 active students (12 males, 11 females, age range 25 to 63) in the course on distance education. The course is a 10 ECTS online course but with two one-day (six hour) campus sessions, one in early January and one in early April. People who cannot attend the campus sessions in person are invited to participate online (via Adobe Connect) and/or can watch recordings from the sessions. Before the session students read Anderson and Dron's (2011) article on the three generation of distance education pedagogies and the article was discussed during the session. The MOOC project was the first assignment in the course (2.5 ECTS, 25% of the final grade) and was introduced in the campus session. The majority of the participants had never signed up for or completed a MOOC and were not aware that such courses existed. Six teams of students were formed (3 to 5 students in each team). A list of potential MOOC providers and individual MOOCs were listed in a Google document and during the session the teams divided the list between them and identified potential MOOCs of interest from each provider. After the campus session the team work continued mostly or entirely online (depending on groups) and got six weeks to complete the project. They also got a list of references (reports and journal articles on MOOCs in education).

Table 1 gives an overview of the 17 MOOCs which were selected. In all cases only one student chose each MOOC except for one MOOC on teaching with Moodle from Moodle.org, which was a topic of high practical interest to many of the students, some of whom were aiming to create a Moodle course in another assignment later in the course (Moodle is also the most widely used LMS for schools and universities in Iceland). There were seven different courses (41%) run in the Coursera platform, four (24%) by edX, two by OpenLearning, one by FutureLearn, one by Alison, and one by PR Academy. The content of about 41% of the courses (7) was related to ICT and media in education and/or distance or blended learning. Whereas the other 59% had content in relation to varied themes including language, physics, sustainable development, and personal development, see Table 1.

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Table 7: Overview of MOOCs in which students participated in the course Distance Education at the University of Iceland – School of Education, Spring 2016

Courses	Providers	Group(s)	Participants
Terrorism and counterterrorism	Coursera – University of Leiden	A	1
Learning how to learn	Coursera – UCSD	A	1
Games in education: Gamification	Open Learning	A	1
Machine learning for data science and analytics	edX – Columbia University	A	1
The Science of Happiness	edX – Berkeley University of California	B	1
Film production: Behind the scenes of feature filmaking	FutureLearn – Creative Skillset, The Production guild	B	1
Public relations	PR Academy	B	1
On-Ramp to AP* French language and culture	edX – Weston High School	B	1
Creative leadership for effective leaders	Open Learning	C	1
Teaching with Moodle	Moodle.org	C (4), D (2), F (1)	7
Blended learning: Personalization education for students	Coursera – New Teacher Center, Silicon Schools Fund, Clayton Christensen Institute	D	1
LearnToMod for educators	Coursera – UCSD	E	1
Positive psychology	Coursera – University of North Carolina	E	1
How things work: an introduction to physics	Coursera – University of Virginia	E	1
Sustainable urban development	edX – AMS Institute, University of Delft, Wageningen (MIT)	F	1
Programming for everybody (getting started with Python)	Coursera – University of Michigan - School of Information	F	1
Diploma in sustainable development	Alison	F	1

All six groups did online presentations (via Adobe Connect) in mid-February outlining their experiences and turned in their final report about a week later. In the final version of this paper, major themes and conclusions from these reports will be introduced. In addition, one or more students will be invited to do additional work for course credit in April and May for a final project and co-author the final version of this paper. Then additional data will be presented from a survey and/or phone interviews among the cohorts participating the course in spring 2014 and this spring. Data will then be presented for example on whether and then how the cohort of 2014 applied their experiences of participating in MOOCs.

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Authors

Sólveig Jakobsdóttir and graduate students in the course Distance Education (NOK042F) at the University of Iceland – School of Education, Spring semester 2016. All students in the course (23) participated in a project in January-February which involved signing up for a MOOC course and evaluating their experience. Six groups of 3-5 students wrote reports on which this paper draft is based. One or more students will be invited to work with the teacher on a more detailed version of the paper and co-author and co-present the paper in Budapest if accepted.

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ICT CONTESTS AS A ROAD TO COMPUTER LITERACY OF OLDER PEOPLE

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The use of ICT has deeply integrated into people's life helping them not only in educating themselves but also in accomplishing different day-to-day tasks. Every aspect of life – learning, working and leisure – has been backed by technologies leading to a revolutionary new quality of life. Traditional universities responding to the challenges of the new lifestyle find themselves more and more involved in the process of creating programmes for adult learners. Lifelong learning based on a new learning culture has become the backbone of today's educational process reaching those age groups who only recently seemed excluded from being active users.

Plekhanov Russian University of Economics has always embraced all new tendencies of changing environments. ICT-backed learning has become an inseparable part of educational process for Plekhanov digitally equipped full-time students while the whole principle of distance education is based on technologies. Supporting the idea of lifelong learning the Faculty of Distance Learning of Plekhanov University provides short-term distant courses for the mature students who want either to upgrade their skills or to completely change their occupation. The more recent achievement is the programme aimed at digital education of older people which was introduced several years ago to eliminate digital division between generations and has been successfully functioning up to now. To encourage retired people in their usage of ICT even more, Plekhanov University in collaboration with the Council of the Federation Committee on Social Policy and the Union of Pensioners has launched a series of computer quests and championships for them on its premises. The success of the event has inspired Plekhanov University to not only continue the work in the future but also to turn back to the students and teachers and to organize championships among them.

Background

Currently pensioners make up one third of the population of Russia but only 15% of them possess the skills of working on the computer. The Council of the Federation Committee on Social Policy fully understands that only by enhancing the computer literacy among older people they may improve the quality of their life and better integrate them into the society, in accordance with the principles of *active aging*. The long-term strategy has been elaborated to popularize computer training among pensioners including introduction of specific methods of teaching and opening classes in close proximity to these people, for example using the infrastructure of educational institutions – schools and universities, as well as regional offices of non-governmental organizations. The programme is spreading geographically embracing new regions almost every month - new centres are being opened not only in big cities but in faraway villages. Thus the Ministry of Labour has reported that 1,800 computer classes started their work in 2014 where more than 200,000 retired people learnt their computer and Internet skills. But according to Valery Ryazan, the chairman of the Union of Pensioners, more than 10 million people are still in need of such training.

On the other hand the turning point in the retired people's lifestyle may become their ability to solve everyday problems staying at home and not visiting different organisations in person. By learning computer skills older people can help themselves to make their daily routine easier. So different schemes are being worked up with the emphasis being placed on the ability of people to connect themselves to public services via the Internet. Different state bodies, shops and commercial banks at least in big cities already provide access to their services remotely, so people do not have to stay in queues to pay their utility bills, maintain their bank accounts or get their appointment to see the doctor.

So the Faculty of Distance Learning of Plekhanov with its *Silver generation* project has been involved in the programme for 4 years. The main aim of the programme is to encourage and support older people in their usage of Internet services. In order to make computer training more challenging the pensioners were offered to compete for the title of the champion of Russia on the premises of Plekhanov at the final stage.

Project

Before the organisation of the championship it was necessary to formulate its purposes and identify the age groups. As in Russia the retirement age for women starts at 55 and for men, at 60 the same criterion was agreed for the participation in the championship. The second criterion was that only people whose previous work hadn't been connected with computers and who had successfully finished the computer-training courses could take part in the championship.

The following goals were defined:

- To spread the idea of computer training among older people;
- To inform older people about the possibility to get state and municipal services via the Internet;
- To attract older people towards electronic social discussions and control over state and municipal authorities;
- To develop the system of computer training.

From the organizational point of view the competition consisted of three main stages. The first one was distant – the pensioners had to prepare a presentation *Information technologies in my life* in MS PowerPoint 2007/2010 at home and then sent it to the organizational committee. In the presentation the participants had to describe their process of ICT learning, and then inform how they apply their computer skills afterwards and what state services they

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use. The best presentations were selected and their authors were invited to the regional centres of the Russian Federation to participate in the second stage. And so only the winners of the second stage could come to Plekhanov Moscow to take part in the finals.

To guarantee the fairness of the championship on the second and third stages the participants were divided in two big groups – the beginners and the confident users, so that they could compete only within these groups. But all of them had to fulfil the tasks in the following fields:

- in MS Office Word and MS Office PowerPoint applications;
- with Google or Yandex search engines;
- with portals of state services;
- with electronic services of Pension Fund of the RF, Rostelecom and the banks with state ownership (Sberbank, Posselkhosbank).

For all the tasks they had not more than 20 minutes.

More than 2 thousand people from 59 regions took part in the preliminary stage and 150 pensioners – the winners of the regional stage (2 people from each region) and 6 foreign teams from Belarus, Belgium, Slovakia, Abkhazia, Kazakhstan and Uzbekistan – participated in the finals. The big hall of the Plehkanov oldest building was fully equipped with the computers and 8 members of the jury presided by the head of Plehkanov IT department judged the competition, which lasted two days.

On the first day the contestants had to create *A calling card* – a brief presentation of themselves in MS Office PowerPoint and format the text with graphs and pictures in MS Office Word in accordance with the template. Then they were supposed to find all Kremlin constructions with the help of Yandex search engine, tick them on the map and answer the questions about them. *Yandex Panoramas* web-service had to be used to find the virtual building of Plekhanov from a particular point. The next task was to pay the utility bills and get the appointment to the doctor on *State services.ru* website and to find the information about banking products for pensioners on Sberbank site.

The second day was devoted to the role-play *For all occasions* where teams of pensioners competed with Plekhanov students. With the help of *Consultant-Plus* law reference system the teams had to complete the marriage agreement and to answer the questions on spouses' mutual responsibly. The involvement of students benefited both sides as older people can share their experience and young people help with the computer skills. In general Plekhanov students are active participants of *Silver generation* project helping older people out of classes as volunteers.

In the end of the contest the winners got diplomas and medals and the best team was awarded with the cup.

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Conclusion

The computer contest has demonstrated sincere interest of older people in the programmes like that. Such events may serve as a good incentive for older people to get computer training, which contributes tremendously to the idea of active aging, promoted by the government. Besides, they may encourage the authorities especially in the regions to develop computer courses in order to embrace as many people as possible. The fact that computer literacy may help a retired person live a fulfilling life and be in demand in the community should no more arise any doubts.

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INCENTIVISING ONLINE AND OPEN EDUCATION: CAN GOVERNMENT FUNDING CHANGE PRACTICE?

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Abstract

Universities in Canada have been fairly slow to consider or adopt online and open educational practices, despite the global trends in this direction, demand from students, competition from other jurisdictions, and more recently, Government interventions. Recent policy and funding initiatives in Ontario, the most populous province in Canada with the highest number of universities, are aimed at increasing students' access to high quality online and open learning opportunities. These initiatives provide institutions with external incentives to develop online courses and programs, and have led to some very traditional institutions exploring the possibilities of online education for their students, and the institution more broadly. In 2013, the provincial government introduced the Shared Online Course Fund (ShOCF) to provide financial support for institutions and instructors interested in developing high quality online programs, one-off courses, and open educational resources to support student learning. This was the first time funding had been directly available for course development in Ontario, and was seen as a recognition that online teaching and learning was both valued, and that it generally requires investment of resources up front to be done well.

From a policy perspective, the whole reform program is expected to cost approximately 2% of the budget for higher education in Ontario over five years, and the course development funding represents less than 0.2% of the budget. Despite such modest investment, the approach has encouraged strong participation from almost every university in the province, and has so far led to nearly 300 new online courses and many new programs being developed in the three years since it started. While it is too early yet to tell the long-term implications for the sector, current data suggests that direct policy intervention, combined with moderate funding support may be an effective means of incentivising universities to adopt more flexible approaches to education, including online and open educational practices. This study draws on policy analysis methods (document and discourse analysis), analysis of policy documents, examination of strategic planning documents in universities, and participation data from the Shared Online Course Fund program to examine this question.

Incentivising online and open education – the state of play in Ontario

Online learning is one of the fastest growing sectors in higher education (Carey & Trick, 2013; Johnson et al., 2013). This approach has been a significant and normal part of learning at all levels outside of North America, particularly in Europe and Australasia, for a considerable time, but has only recently started to take hold in the US and Canada (Carey & Trick, 2013). Despite some early and significant contributions to online and open teaching and learning, including offering the world's first MOOC (Siemens, 2005), the majority of Canadian institutions have generally been slower to take up the online pedagogical and cultural revolution than their counterparts (Canadian Virtual University Consortium, 2012). Many in the traditional faculty ranks of Canadian and U.S. institutions are highly suspicious of online learning, suggesting all manner of problems that are assumed to only exist in online courses, such as plagiarism, lack of academic integrity, lack of rigour, and poor quality learning experiences. These positions are largely driven by ignorance and have little basis in the empirical literature.

In 2012, the Government of Ontario began a process of reforming higher education in the province (Government of Ontario; Regehr, 2013). Universities are legislatively the responsibility of provinces in Canada, with no federal oversight or regulation, and thus, significant reform that usually involves financial drivers is often highly constrained by the smaller budget and local agendas of the provinces (Clark & Norrie, 2013). Ontario's reform agenda includes managing costs, increasing access and accessibility for all Ontarians, improving employability and mobility of graduates, assessment of teaching and learning outcomes, and technology enabled and online learning. Mobility and access have been particular issues in Ontario, where lack of accountability and funding disincentives to allow mobility have created significant barriers to students who are unable to study full-time on a physical campus of a single institution.

In 2013, the provincial government announced the Ontario Online Initiative (OOI), which was intended to help drive universities towards the provision of more online educational opportunities. This was coupled with the Productivity and Innovation Fund, a one-off injection of funding meant to help universities implement technology and practices that would increase differentiation, improve efficiency, and enhance productivity of the 21 publicly-funded universities in the province. In all, over $CAD72m was budgeted for higher education reform over 5 years, representing about 2% of the $5b budget of Ontario's higher education sector. The ministry responsible for universities in Ontario (Ministry of Training, Colleges, and Universities (TCU)) launched a funding formula review in 2015, which will see the first major change to the university funding model in 50 years. It is expected that this will include performance-based and special projects funding as a normal part of the funding allocation process.

Near the end of 2013, the OOI developed a Shared Online Course Fund (ShOCF), which included $CAD9m in funding for online course and open access module development across the university and college sectors. Instructors and institutions could apply for up to

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$CAD75,000 to support the development of either high quality fully online courses, or open access student support modules. This was the first time the provincial government had directly funded the development of online courses, and was also the first time they had provided funding specifically for course design and development outside of operating revenues. It also represents one of the first attempts by a Canadian government to systemically change practice in higher education using a combination of funding and policy. Additionally, 2015 saw the launch of eCampus Ontario, a non-profit arm's length consortium made up of all colleges and universities in the province. This organisation, presently funded by the provincial government, is a centre for excellence in online learning and teaching, and will develop methods of further embedding and expanding online and open learning across the province.

Methodology

This research presents a case study of the higher education policy and reform agenda in Ontario, Canada that is driving change in online and open learning in the province. An exploratory descriptive research design (historical perspective, policy analysis, document analysis) was employed to investigate how this agenda was being implemented in Ontario universities. The study draws on policy analysis methods (document and discourse analysis), examination of strategic planning documents in universities, and participation data from the Shared Online Course Fund program to examine this question.

How effective is the ShOCF and other reform measures?

This paper explores the changes that have occurred across the higher education landscape in Ontario since 2012, particularly focusing on the impact of the Shared Online Course Fund (ShOCF). Depending on how one defines success, the ShOCF can be considered a successful policy intervention in changing some metrics for online education in Ontario. To date, nearly 300 new online courses have been developed through the funding (TCU, 2015), many of which are part of larger plans to create fully online programs. Almost all universities in the Province have applied for and/or received funding support to develop either courses or open access modules. Perhaps more importantly, the application process at most institution requires instructors to work closely with centres for teaching and learning or their equivalents to prepare the application, which provides a form of situated academic development, and each application is peer reviewed by experts from out of province, with quality of the design the highest weighted set of review criteria. Instructors are provided with feedback so they can improve for the next round. For most of these instructors, this is the first time their teaching and learning design has ever been made public or reviewed by another person, and for many, it is their first interaction with online learning specialists.

Significantly, the funding encourages institutions to collaborate on the development and delivery of these courses, as well as shared programming across institutions. At the most basic level, it has encouraged institutions to recognise each other's courses for credit in their own programs, although this can be still considered a significant challenge in the current climate. This paper will also explore some of those challenges, including systemic (funding, lack of

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data) and local (institutional policy, data integrity, procedures) barriers that make transfer between institutions problematic.

A second major initiative of the online learning agenda was the development of an online portal, eCampus Ontario (http://www.ecampusontario.ca), as a one-stop shop for finding all online courses in Ontario, and identifying existing equivalencies with other courses in the province. It automatically draws institutional course data (course description, mode of delivery, and equivalencies) from a central repository held by the Ontario Council on Articulation and Transfer (OnCAT), and allows institutions to promote their online courses and programs on the portal through extended course descriptions, relevant images, and multimedia. This initiative has increased the sense of competition between peer universities to be better, to offer more online courses, and to do more to provide better information to prospective enrolees on what they can expect in their online courses. Eventually, the portal will provide institutions with data that can help in local programming decisions.

The portal also provides both students and instructors with access to a wide array of online supports. Mostly open access and Creative Commons licensed, these range from general support for understanding and becoming an online learner, to specific learning supports for a wide range of topics (e.g. math, academic writing, academic integrity, and many more). There is also an ongoing project to identify instructor support needs, and to develop the most effective tools to help them understand and perform their role in online teaching and learning.

The online initiative has been highly visible at Ontario's universities in the last three years, and this has spurred a conversation about online and open education that was not possible just a few years ago. While there is still strong suspicion from instructors, unions, and university administrators about the ultimate aim and outcome of expanding online education, there is no doubt that the renewed interest in teaching has forced many to re-examine their role and practice as educators. It has also forced the sector to consider the needs of learners in contemporary higher education. Canadian universities are notoriously traditional and have been slow to adopt technology, evidence-based practice, and student or learning-centred approaches to education (Drummond, 2012; Fallis, 2013). The reform agenda, at least for now, seems to be driving change across the sector, but it remains to be seen how this will translate to sustainable and systemic change for Ontario's universities.

This paper provides insights into how governments can work with universities to facilitate greater uptake of online and open learning approaches, and how these can be embedded in normal practice in institutions that are highly resistant to change.

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IS E-LEARNING AN OPTION IN INCLUSIVE POST-SECONDARY EDUCATION?

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Abstract

Individuals with disabilities in the United States (US) face many of the same challenges including stigma, discrimination, social exclusion and inadequate community resources for rehabilitation and employment (Unitednations.org, 2015). Employment for individuals with intellectual and developmental disabilities (IDD) seems to be a more elusive idea in that individuals with IDD are most often employed part time and are paid a lower wage than their fellow workers without disabilities (Butterworth et al., 2012). This is particularly problematic as employment has been recognized as an important goal for improving the quality of life of adults with IDD (Siperstein, Parker & Drascher, 2013). In an effort to close this disparity, rehabilitation providers need a standardized way of assessing individual client need across different subsystems, as they relate to barriers and resources to employment. With this standardized method, rehabilitation providers will be able to customize services with the goal of improving placement outcomes and reintegrating individuals into the labour market.

The purpose of this proposal is to introduce a new instrument based on the Geist and Calzaretta (1982) Systems Approach to Placement (SAP) model that focuses on assessing the needs of Transition aged adults with intellectual disabilities enrolling in and graduating from an inclusive post-secondary education (IPSE) program. Transition aged adults with ID (N = 85) in a mid-south IPSE program will be assessed to establish a profile of ID clients. Content validity for items will be established by consulting experts in needs assessments and rehabilitation counselling.

Young adults with intellectual and developmental disabilities (IDD) have traditionally struggled with the realities of transitioning to adulthood, particularly as it relates to employment, struggling with greater unemployment and lower wages. Skills related to employability, independent living, self-advocacy, and interpersonal interaction are regularly stressed in secondary special education programs, but are often inadequate to meet all the needs of every student of this very diverse population. Inclusive Post-Secondary Education (IPSE) programs are growing in popularity to address this problem. But building an effective and sustainable program that meets the needs of the local community comes with many challenges, the most salient of which are assessing and addressing students' individual service needs from a systems perspective and preparing students for the social/behavioural requirements of the world of inclusionary work. Fortunately, tools have been developed to address both of these issues. The purpose of this presentation is three-fold: (a) to present a model for IPSE that provides effective and sustainable transition services and vocational training for young adults with intellectual and developmental disabilities addressing sustainability, community outreach, partnerships, research, diversity, and management of a transition focused IPSE program; (b) to present a working model of applying the SAP, evaluating service needs across multiple subsystems to improve job placement of individuals with intellectual and developmental disabilities; and (c) explain the utilization of the PBIS system of interventions in an IPSE setting, where individuals with intellectual and developmental disabilities receive vocational and social training.

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KNOWLEDGE IN MOTION BETWEEN FORMAL EDUCATION AND PROFESSIONAL PRACTICE – HOW TO DESIGN FOR LEARNING ACROSS BOUNDARIES

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Introduction

The title reflects our attention towards the significance and importance of learning contexts in education. A widespread assumption in much educational research is that formal educational settings and workplace settings are seen as separate learning contexts, rather than as connected contexts (Edwards, Biesta, & Thorpe, 2010). We need to know more about how adult students experience and connect learning across boundaries of different learning contexts (Akkerman & Bakker, 2011).

With this request as a starting point, we examine how adult students perceive their learning between formal educational settings and work. We focus on how the students manage to bring their learning from formal education to their workplace, and the other way around. We are especially interested in how learning has the potential to be realized between learning contexts by using digital technology.

We present selected examples from flexible courses at Lillehammer University College in Norway. These courses aim at different groups of professional workers and at developing their professional competences, for instance ambulance workers, employees of municipalities, public health coordinators and teachers, and both among individuals and in the organizations as a whole. We present and discuss our didactic-pedagogic approach aiming at inspiring students to connect learning at work and in formal education. Many suggest that communication, collaboration problem solving, decision-making, and ways of working etc., are central in what is designated as 21st century skills and key competences (Griffin, McGaw, & Care, 2012). We analyse how students experience their participation in different activities in educational programmes, and how their professional competences are being regarded and further developed in their daily work.

The following questions guide our study: *How do adult learners experience their participation in continuing education? In what ways do they find the course content and methods relevant in relation to their professional work and professional competence development?*

Our main focus is on how the students experience and perceive the content and the methods, for instance dialogical groups, video lectures and peer-based learning, as relevant in their professional work related to practice and ways of thinking (Griffin, McGaw, & Care, 2012). By drawing on these courses as examples, we pursue the issues presented above by exploring the relationship between our didactic design and the way students use and negotiate the learning resources.

Based on relevant theory on learning and flexible online education as well as selected cases, we discuss and suggest some relevant criteria to promote learning at the boundaries (Akkerman & Bakker, 2011). We argue that learning criss-cross formal and informal learning contexts, and that it is vital to approach formal educational settings and workplace settings as being connected rather than separate learning contexts (Edwards et al., 2010). We want to contribute to bridge a potential gap between formal and informal learning at the workplace.

Methods and data

Our data include surveys and focus group interviews with selected students. The surveys contain data from evaluations of a number of student groups (about 150 students from to different courses) The surveys also include some qualitative data as we encourage students to tell in their own words how they experience methods and content. We have used QuestBack, a net-based survey tool for organisation and analysis of quantitative data. As for the interviews, we use a thematic analysis approach (Bernard & Ryan, 2010) to analyse how students experience the methods and content in question, and on how they experience and negotiate own competence development across the educational context and own workplace. Thematic analysis allows for organising the material into categories, such as increased reflections on own practice; i.e. challenges, expectations and possibilities attached to own professional role, and ways of collaborating with others (ways of thinking and practicing). By drawing on empirical data, we discuss how flexible definitions of skills and key competences, assumed to result from dialogue, reflection and peer-based learning, are valid according to the situated contexts in which they are learnt and practiced.

Continuing education and learning within a socio-cultural framework

We build on a socio-cultural perspective on learning (Säljö, 2006; Wertsch, 1998) highlighting learning as relational and as situated in social practice. According to the socio-cultural framework, it is vital to understand learning as occurring in different social practices. Learning is seen as relational and as occurring in participation with others in different contexts, and by using different resources (Wenger, 1998). In the particular study programmes contextualizing this paper, such resources are dialogic collaborative groups, fellow students, teachers, books, video lectures, and digital technology. According to a socio-cultural perspective, learning is not confined to the individual mind. By adopting this approach, we go beyond thinking of learning as an occurring consequence of the didactic design and the arrangement of learning content. Rather we understand learning as dependent on how the dialogic groups as resources are being used, re-negotiated and repurposed (Dirckinck-Holmfeld et al., 2009).

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Measuring learning situated in and between formal education and workplaces is far from easy. It is almost impossible to isolate individual learning as consequences of specific activities. Hence, we focus on the *learning potential in different activities* according to how the individual student acknowledge and recognize the potential, which is dependent on a range of personal and contextual aspects (Dysthe, 2001). In almost all of our study programmes we require collaboration as valuable, underpinning our arguments by building on theoretical insights about how people might learn in collaboration. Collaborative learning implies group discussion and interaction. Collaborative learning implies viewing the learner as being active in a learning process that is collectively constructed (Wenger, 1998). In our context, it is for instance important how the individual position oneself and communicates within a dialogic groups, how they experience peer-based learning across different disciplines and subjects. It is also important to examine how the employers arrange for communicative arenas at the workplace.

Dialogue, discussion and reflection are not new elements in higher formal education. However, what is new, are opportunities for other kinds of interactions by using digital technology and flexible arrangements. In continuing education students can arrange for self-directed and self-motivated dialogues in groups either within the formal educational program as well as across education and workplace. The students can choose to use digital technology, like MOOCs or Skype, or they can arrange for dialogic groups at campus or at work. Adopting a socio-cultural perspective on learning, we explore how students perceive and experience the methods and learning activities, such as opportunities to express own arguments and perspectives in sessions online or at campus, or in informal talk. Our aim is to analyse how students experience the relevance of participating in different activities and negotiating resources across the two learning contexts.

Based on research arguing that it is vital to design, develop and facilitate continuing and lifelong education according to a theoretical framework, we build on a socio-cultural perspective on learning underpinning our design of collaborative methods and assessment principles. This theoretical perspective, such as teachers, peers, books, computers and digital networks. By recognizing learning as relational and as occurring in participation with others in different contexts, and by using different resources, it is possible to expand learning spaces and contexts from classrooms to workplaces. By drawing on selected cases, we discuss how to facilitate and support activities allowing adult learners to relate, connect, identify and interact with different learning resources building on their experiences and knowledge from both formal education and workplace settings. We draw attention to how we organize for activities, connections and the use of resources as vital for mediating learning.

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Learning across boundaries – Some vital aspects based on empirical findings in cases

Our ways of facilitating courses are inspired by research highlighting the importance of promoting opportunities for adult learners to express own ideas and perspectives, and encouragement to improve thoughts, ideas and arguments in their assignments (Mason, 2003). The central issue is how to enhance reflection on action and thus reflexive practice aiming at developing own and organizational practice. We put particular emphasis on a mixture of obligatory and voluntary elements as a design principle, in order to engage the students to reflect, share and participate. For instance, results from a survey of one of the courses from which this presentation is based, show that a majority (62.5%, N 24) expressed that the course had contributed greatly to change their practice. The following excerpts from one of the focus group interviews might emphasize these results:

> *"It is not always I do things differently, but I understand more why we practice the way we do. You have to consider elements from various angles, which allow you to consider other aspects of a situation in different ways than you could before ... all the things you can combine to find the best solution. Our subject is much more complex than I used to think before."*

This utterance clearly indicate that participation in the study program contribute to increase the students understanding of the discipline and the profession to be more complex and complicated. Content and methods had arisen awareness of both challenges and possibilities in own profession. In another course we have examined a flipped classroom approach, that is, we encourage the students to watch video lectures before attending lectures at campus. The lecturers draw on these video lectures in their own lectures at campus. In a survey of this course, one of the students expressed his experiences from this and related to own profession in this way: "I find it useful when lecturer sums up because it requires critical thinking and allows for reflection on own practice." In the same way as the utterances mentioned above, this example might highlight how formal education contributes into workplace learning and development.

Based on what the students emphasize in the interviews and surveys, we suggest a student-centred approach where the following aspects are vital:

- Methods engaging students to participate in learning activities they experience as meaningful, and that urges them to think about what they are doing (active learning as opposed to the traditional lecture where students passively receive information from the instructor).
- Methods and structure that require commitment in reflection activities on short- and long term goals, both from teachers and fellow students, stimulating meta-reflection

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regarding own development, such as point of departure, learning goals, and how to get there

- Methods building on peer-based learning, inspiring students to engage in one another's learning.

To sum up, we emphasize a perspective on continuing and adult education by focusing attention towards connections between learning contexts and on student-centred approaches. The overall aim is to facilitate and organize formal education to be as relevant as possible in professional learning. We suggest a solution that expands learning spaces and merge learning contexts in order to provide students with opportunities to draw on and develop own experiences, knowledge and skills by using a range of contextual resources.

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THE SIGNIFICANCE AND POSSIBILITIES OF INTERNATIONAL COOPERATION BETWEEN INSTITUTIONS OF HIGHER EDUCATION

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Introduction

The significance and importance of international relations is increasing for the institutions of higher education of our homeland. It is comprehensible, since, as a natural consequence of globalization, we are experiencing the augmentation of international cooperation in all fields. Considering the international nature of medieval universities – the Sorbonne of Paris or other Italian and Spanish universities had the sons of various nations – we can claim that higher education has long been exploiting the advantages and enjoying the benefits of international relations. Hungarian higher education has roots too dating back to centuries. We have many foreign students today. Establishing and maintaining connections abroad has become so easy and usual in our day, no wonder if the role and possibilities of international cooperation have expanded.

We can see a particularly significant increase in the role of international cooperation contemporarily. It is due to many factors, but all are consequences of globalization. Hardly any event in the world lacks international consequences.

Connections

It is clear for experts on higher education that universities and colleges have numerous functions supplementing teaching and research. Institutes in higher education are centres for knowledge and skills. Moreover, they have to respond to the ever changing demands of society and provide learned and skilful experts for the job market. Generally speaking, they have to contribute to the social, cultural and economic maintainability of the state. Higher education can fulfil these tasks only by applying a multi-layered system of cooperation and cooperating tightly with other institutions. The professional cooperation built and maintained with foreign institutions can be especially fruitful in this respect. Most Hungarian institutes have connections to other European universities and colleges, most of which enjoy international recognition.

Universities and colleges have always afforded thorough attention to establishing and nursing connections to other institutes. Thus they are cultivating connections to other units in higher education, research centres and firms employing alumni. To cooperating with foreign institutions of higher education they attach great importance. We learn each other's experiences and can gain mutual advantage by exchanging them.

We can compare many fields in higher education, curricula, course materials, new methods and systems of teaching, and we can count on further exchange of teachers' and of course, students' experiences. Higher education is constantly changing all over the world and hence requires much attention and creates many challenges. Though often inconvenient, we all see its benefits. Exchanging each other's experiences on these topics might also be fruitful.

International cooperation has many forms and levels. Cooperation formed or functioning at the highest levels influences cooperation at lower levels. For example, an institute or just one of her employees may benefit from a ministerial level cooperation agreement. However, we wish to focus on lower, institutional (or even departmental) level activities and relations, since we are active at this level and have great possibilities here too.

Cooperation is really rewarding if it satisfies the following requirements:

1. well defined particular activities belong to its scope,
2. it is operative, planned and nursed,
3. institutes have designated persons responsible for the cooperation.

Opportunities of cooperation

Formal call of leaders and comparing notes – Constant learning forms an essential part of the activities of a leader. Especially top leaders have to keep their knowledge up to date in the field of their institute. A leader of an institution of higher education on economy for example has to follow what is evolving in economics.

Exchanging or adopting course materials – The benefits of this are easily understandable since the institutions access course material practically free, and can use them in teaching. Refreshing the curriculum of the receiving institute by integrating new knowledge could be an additional return.

Exchanging faculty – Institutes of higher education cannot forget the importance of continuously training their faculty (and of course leaders). Learning a partner institution is an important opportunity to enrich the knowledge of faculty members. The mere change of location and atmosphere might be impregnating for the thinking of a teacher. The extra knowledge acquirable at a new location is of course more important. Exchange programs for faculty members benefit not only the participating teachers but may profit both the sending and receiving institutions too, since effects are probably mutual. The advantages are obvious for the faculty member. If, for example, a teacher can work at a foreign institute, he can earn the experience of his life. Moreover, he can improve his command of the language.

Exchanging students – We could ponder if exchange programs for faculty or students are more important, still it is simpler and more adequate to say that both kinds of programs are very significant. It is truly important for teachers to know the nuts and bolts at partner institutes, and it is far from being indifferent for students to know how work is done in other schools.

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Cooperation between institutions – The exchange of faculty and students may form a part of a long term cooperation between institutes, but cooperation may comprise many other areas. Some of the forms seen frequently are scientific cooperation, organizing joint programs, issuing joint publications. Institutional cooperation can be realized only by connecting individuals, persons have to participate. Cooperation is operative only if in addition to the connections established by the leaders of institutes more and more teachers and students (!) get involved in the organizations. Involving students into the running of an institution is very important, while it is problematic too, since students, after having spent a short time, a couple of years at most at the institute, 'join life' and leave the committee or other organization they have recently been members of. May the presence of a student be transitional in a committee or organization, it is very important, since, let us keep in mind, the university originally is a community of faculty and students. The name *universitas* refers to the company formed by teachers (professors and masters) and the students. Higher education has a democratic air traditionally, since the primary purpose of participants is the common strife for knowledge. Rank and title are less important.

Joint programs – Probably programs held jointly are the easiest and simplest to organize among the various forms of cooperation. We can make programs held together with partner institutes, universities or colleges as well as with particular schools, institutes (department groups) or departments. These events contribute to maintaining friendship and promoting professional progress. Joint programs appear as scientific events most frequently under various names such as conference, forum, meeting and so on. While the name may refer to the type, official nature of the event, it is not the name that counts. More relevant is the opportunity to talk to our colleagues, friends and discuss our common issues.

Scientific and social ties – Living in a society and teaching in higher education we are intellectual leaders of our students and humble researchers of our field. We are human, feeling happy or not so comfortably when things do not seem to work out fine. Anyway, we have emotions that also count complementing our thoughts. We are transferring our ideas belonging to the course material in the classroom still our emotions appear impregnating our lecture. It is not our task to express our emotions (we are not poets). Moreover, expressing emotions is not even desirable, since students' interest is focused on the knowledge we are supposed to transfer according to our contract with the college, the representative of society.

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REDEFINING THE STUDENT EXPERIENCE: INFORMATION-SEEKING BEHAVIOUR – THE COMPLETE PICTURE

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This paper is based on detailed research from a completed PhD into the information seeking behaviour of a diverse and international distance learning community of over 50,000 students, the contextual factors affecting the student experience, and the implications for the design and scalability of the learning environment. It addresses several themes of the conference including the understanding the experiences of MOOC participants, concepts of scalability of the learning environment, e-competencies and e-skills for learning and working in an open and connected world, and opening up the world of education to wider and more diverse participation.

There has been an increase in importance and focus on the *student experience* in higher education recently. In the UK it is regularly mentioned in university surveys, league tables, in recruitment and marketing material, and strategic planning documents. According to Morgan (2016), student experience "encompasses all aspects of student life (i.e. academic, social, welfare and support) with the academic imperative at the heart of it" (http://www.improvingthestudentexperience.com) and these aspects are more diverse and more determining of the student experience for distance learners. The change in focus has been due to a number of factors including: the increase in the costs of delivering HE, the reduction in government/state funding and resource constraints, the increase level of student diversity (Morgan, 2016), as well as the increase in the competitiveness of the higher education market which has made students more demanding and better informed about what services and support to expect from their institutions.

As the higher education market has increasingly become competitive, many institutions have turned to distance learning as viable alternative of providing teaching and learning of the highest quality to growing numbers of students from diverse backgrounds with fewer resources. According to Unwin et al. (1997), over half of conventional universities are currently involved in postgraduate distance learning provision. However the striking feature of many surveys of student experience, such as the Higher Education Policy Institute (HEPI) and Higher Education Academy (HEA) annual report on student academic experience in the UK, is the focus on the institution's own provision for campus-based students and on learning and teaching or assessment and feedback (Morgan, 2016). There is much less evidence gathered for distance learners and it is unclear whether distance learners are part of surveys, e.g. the HEPI/HEA survey but from the questions relating to contact hours we can assume that they were not. There is also much less evidence collected about the context of the students themselves.

Enhancing the students experience in distance learning

This paper argues that in order to enhance the student experience in distance learning, an alternative and more holistic approach which incorporates the learner's information seeking behaviour (ISB) should be adopted.

This is evidenced by research for a recent doctoral study (Tury, 2014) which investigated the information seeking behaviour of distance learners mainly based overseas and registered with the International Programmes of the University of London (formerly the University of London External System), the second largest provider of distance learning provider in the UK. The study sought to extend the limited body of knowledge in this area by undertaking an information behaviour study of a large and representative sample of widely dispersed distance learners. The research was further aimed at developing a set of recommendations for effectively supporting the library and information needs of distance learners in the digital age.

The research employed a combination of quantitative (questionnaires both online and by post) and qualitative (laboratory-based observational study using think-aloud protocol) methods and one-to-one interviews using open-ended semi-structured questions. The population comprised 1,000 distance learners registered on seven different Social Sciences and Humanities programmes. All participants were registered Online Library users. A total of 649 out 1000 (65%) responded to the survey. They resided in 81 different countries. Statistical analysis using a chi-square test for independence was used to measure the significance of the variables.

The study established that the significant factors which impact the distance learner experience during their degree programme journey directly relate to the learners themselves, the individual context in which they work, and the barriers that stem from that specific context such as those imposed by time, distance and instructional approaches (pedagogy) as well as ease of access to required information sources. They also include demographic, role-related/interpersonal, psychological, environmental and logistical variables as well as sources and their characteristics, the student's social networks and the student's information literacy skills. This paper argues that factors which are presented in a model below need to be taken into consideration when institutions are designing support services, pedagogical approaches, and technological solution for enhancing the 'student experience' in distance learning.

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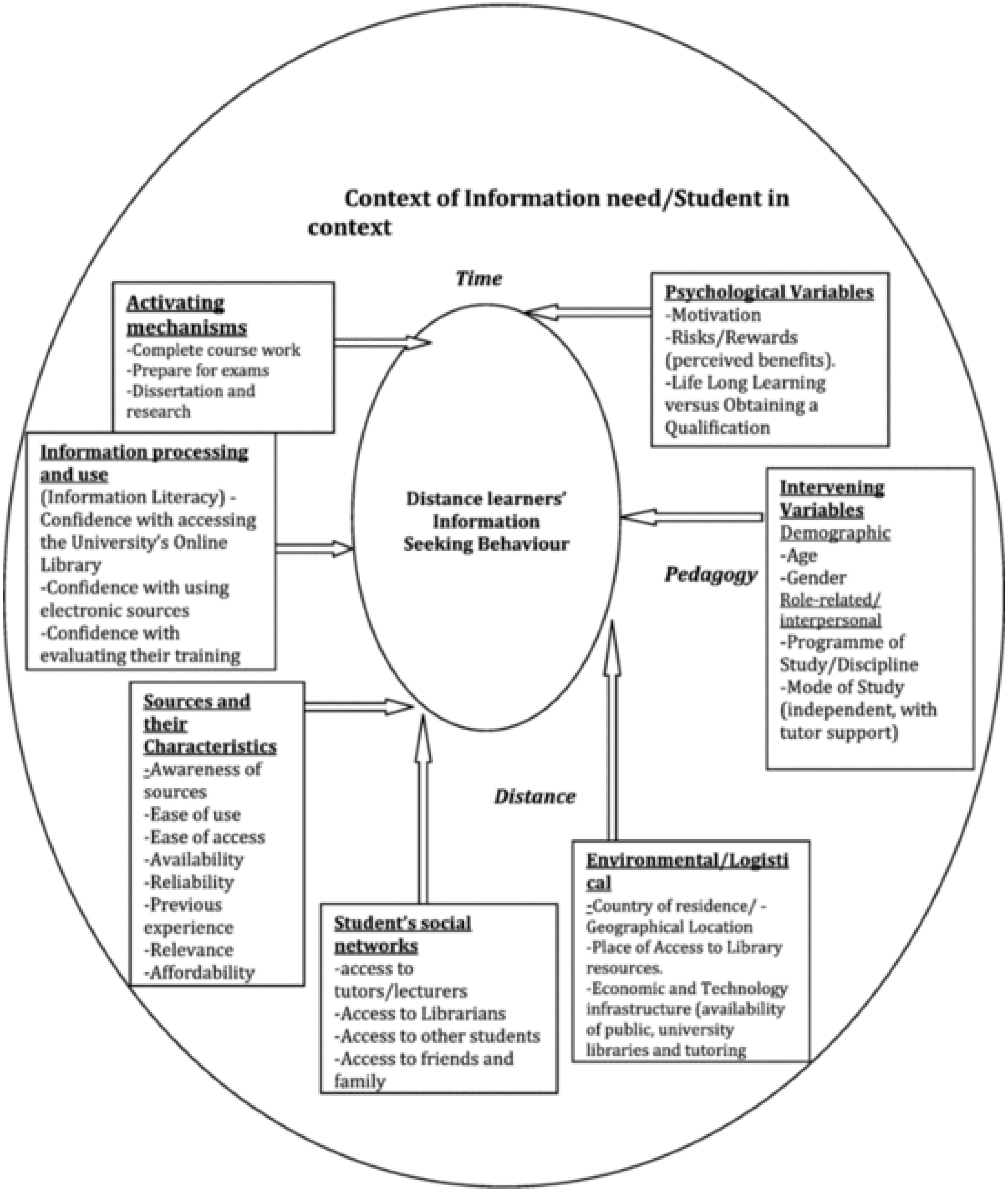

Figure 1. New Model of the Factors influencing the Information-Seeking Behaviours of Distance Learners (Tury, 2014)

The student experience through students' eyes

The study found that there is much more about our students' individual learning and information environments that University administrators, teaching faculty, librarians and other institutional managers know nothing about, or often make assumptions about. The informal, uncontrolled and extra-curricular learning environment which is created by the learners themselves demonstrates their resourcefulness. It comprises group learning, consultation with family and friends, sharing of textbooks, visits to other libraries including local (university, public, and specialist libraries) as well the choice and purchase of books to supplement course texts. Peter Scott, professor of higher education studies at the Institute of

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Education, University College London, (http://www.theguardian.com/education/2014/feb/04/university-education-not-just-about-student-experience) warns against the risk of corporate efforts being focused first-and-last on improving the measures, not the experience itself – in other words, survey *scores*; and greater risk is that the complexity of the experiences of students will be reduced to a one-size-fits-all definition, short-term satisfaction as measured in instrumental and transactional terms.

Key findings of the study of information literacy

Of the 33 factors relating to the distance learner student experience examined by my research, I will give a brief analysis of two factors: 'success at accessing online library sources' and 'reasons for choice of information' relating to information literacy which is crucial to the effective completion of the course programmes especially for distance learners.

Factor one

The first example of relevant factors affecting the student experience is their success at using the Online Library Sources provided by the University.

Table 1: Success at Accessing Online Library Sources

Success with accessing resources	Frequency	% of group
I sometimes access the information I need	337	51.9
I regularly access the information I need	190	29.3
I always access the information I need	64	9.9
I never access the information I need	41	6.3
No response	17	2.6

In terms of success in accessing required information, relatively few respondents claimed to be always successful (10%) or never successful (6%); a matter of concern is that only about one third claimed to always, or frequently, find the information they need. However, those respondents who chose *regularly access the information I need* comprised only 29.3% whereas those respondents who only *sometimes access the information I need* comprised 51.9%, a very low level. Therefore, overall, those who always or regularly access the information they need amounted to just over a third of respondents. The purpose of any *student experience* model would be to understand the factors that lead to these results and the purpose of any application of changes to affect those factors would be to improve these results.

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Factor two

The second example of relevant factors affecting the student experience is 'reasons for choice of information'

Table 2: Reasons for Use of Information Sources (Reasons for Preferences)

Reasons for preference	Frequency	Percentage of Total Sample
They are easy to access	481	74.1
They are easy to use	376	57.9
Readily available	353	54.4
I have previous experience	314	48.4
They are relevant	222	34.2
They are affordable	150	23.1
They are reliable	144	22.2
They are high-quality	113	17.4
Other	5	0.8

In order to understand the reasons behind students' choice of information sources, students were asked the question *what are your reasons for your preferences?* and offered a number of options to choose from. The study found that the most important resource selection criterion was *easy to access* which was selected by 74.1%; this was followed by *easy to use* which was selected by 58% of the respondents, and *readily available* selected by 54.4%. These findings support the Principle of Least Effort (PLE) and have significant implications for the design of any student support services that are aimed at enhancing their experience.

From the evidence presented here, it is clear that a large number of factors impact the students' experience often include those that are personal in nature, logistical, and demographic (e.g. information literacy/digital skills, time constraints) often stem from their unique context. Therefore any institutional model aimed at improving the students' experience should to take into account all factors that affect the student including those which stem from environments which are not provided by the institution. This gap can be closed by incorporating the students' Information Seeking Behaviour in the design of all *student experience* support systems and services. For instance based on the findings in Table 2, in order to improve the experience of these students, institutions need to invest in information literacy development and training programmes. The skills would allow students to find relevant information in the most efficient way, manage information overload, select quality resources quickly, and complete their projects on time. When students are resourceful and able to complete the tasks, they are more likely to complete their degree programmes. And for the institution, retention means a stable source of income.

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MONITORING A LEARNING COMMUNITY IN A HYBRID ENVIRONMENT: A SENTIMENT ANALYSIS

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Introduction: The case of MOOC on coding on the EMMA platform

In January 2016, the EMMA platform (www.europeanmoocs.eu) launched a new MOOC *Coding in your classroom, Now*, created and presented by professor Alessandro Bogliolo from the University of Urbino (Italy). Coordinator of the School of Information Science and Technology at the University of Urbino, prof. Bogliolo since 2013 has been actively promoting the diffusion of computational thinking skills, serving as Europe Code Week Ambassador, founding Code's Cool, and developing DIY unplugged games (Cody Roby). In 2015 he also coordinated Europe Code Week serving as e-skills for jobs ambassador. By offering his MOOC on the Emma Platform, Bogliolo wanted to test the Emma features in online social environment.

The aim of the 13-week course is to help teachers introduce their classes to computational thinking through coding. Rather than presenting theory and methods, professor Bogliolo presents a series of intuitive and fun coding activities for teachers to use immediately with their classes. The first presentation of the activities is in streaming, with live chat, so teachers can resolve any issues they might have in real time, but they can also choose to watch the live presentation along with their class, so that teacher and pupils discover and learn together, in a merging of roles. After the streaming, a recording of the session is available on the EMMA platform along with related practical assignments. As the course goes on, the programme evolves to incorporate the emerging needs of the teachers and their classes as they share feedback after experimenting their first coding activities with their classes.

The course attracted over 4,400 users in its first 10 days, and the majority of these learners are currently very active, on the socials and on the platform. They are already behaving as a community, exchanging information about their area, schools and classes, and using the learning experience on the MOOC to share and build knowledge and even plan meetups in their local area. Although we knew that Coding was a popular and relevant subject for primary and middle school teachers in Italy, and although we knew that the awarding of one CFU for the course would be appealing, registrations on the course far exceeded the expectations of both professor Bogliolo and the EMMA team. It will be interesting to see how dissemination of the course worked, and whether the community remains during, and even after, the course lifetime (Bogliolo & De Rosa, 2016).

This unexpectedly high number of learners on an adaptive course is presenting interesting challenges and specific learning experiences in a series of loops at all levels of the MOOC delivery process – for the platform, for the tutors, for the teacher and for the learners. Although the course is only in its early stages so concrete data is not yet available, a sentiment analysis on the interaction features and social classrooms enables us to study the way that learners respond to the situation, the course and the learning activities, many of which are completely new. Sentiment analysis is also used to explore the way that teachers and tutors present and respond to situations and learner enquiries and communications. (Wen, Yang, & Rosé, 2014).

The EMMA platform: a place for all

The European Multiple MOOC Aggregator, called EMMA for short, is a 30 month pilot action supported by the European Union. It aims to showcase excellence in innovative teaching methodologies and learning approaches through the large-scale piloting of MOOCs on different subjects. EMMA provides a system for the delivery of free, open, online courses in multiple languages from different European universities to help preserve Europe's rich cultural, educational and linguistic heritage and to promote real cross-cultural and multilingual learning. Emma is the sole platform to join both massive and personal learning strategies offering a PLE to personalize learning paths, as well diverse possibilities to participate to the course constructively and effectively. Emma has been created following an agile methodology to offer a customizable environment both to teachers and learners so that all the actor of a learning process can decide what can of tools to use to reach their objective. In the case of MOOC on Coding the topic has been used to leverage awareness, to foster participation and to unlock lateral thinking. This is the reason why the *MOOC' Instructional Design* is created day by day basing it on a preliminary needs analysis and a cycle of improvements. Being a hybrid model of online teaching, the re-mediation of MOOC throughout different online environments and spaces – although very challenging – highlights the intrinsic value of a platform that is not a monolithic but open on other worlds.

A complex learning environment: the learning process as loop

The study aims to show that when a platform and the tutoring team are challenged to find a feasible response to the diverse needs of such large numbers of learners, with diverse levels of experience and competence, they are actually on a valuable learning curve. The strategies they adopt and the materials they devise in order to solve, for example, the setting-up of a peer-review of 3,000 assignments are important lessons to carry forward to further courses. The comments that were published on Facebook by the learners after this first experience of the peer review, showed that the activity had proved to be an unexpected learning experience for the reviewer.

> *"I had no idea that giving feedback on other people's homework would prove to be such a valuable learning experience. My compliments to the staff; this kind of peer review creates a really nice, collaborative learning atmosphere."*

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So the learning environment is designed by the MOOC as a complex network of tools both on the platform and outside it, used as described by Siemens and Downes (2009) with their connectivist model, with a multilayered and multi-level interactions among all the actors involved, including some stakeholders interested in fostering and streamlining the process (EU representatives as well as education department persons etc.).

Existing approaches to sentiment analysis can be grouped into four main categories: keyword spotting, lexical affinity, statistical methods, and concept-level techniques (Cambria et al., 2014).

The sentiment analysis will be a human analysis of contributions from learners in the virtual classroom, and more specifically in the blogs, Facebook page and conversation sections associated with the Coding course. We will select specific moments in the course delivery and communications which have been highlighted as significant by the teacher and tutors, and do keyword spotting, lexical affinity and concept-level techniques to try and evaluate learner attitude. We wish to analyse the effect of delivery mode, collaborative learning tasks and the attempt to create a learning community on learner attitude.

Our analysis will focus on the mode of delivery of this specific MOOC. Using a hybrid combination of real time and asynchronous activities for the presentation of each teaching unit, this course allows us to see the concept of blended learning transposed to the online environment. The varying teacher roles identified by Anderson for the online environment and reformulated by De Rosa and Kerr (2016) for the blended classrooms reconvene in diverse ways depending on the activities. We investigate the continual interplay between the student and teacher roles and attitudes and activities that are familiar to a real classroom and those afforded by the online environment. We try to understand what impact this hybrid model of MOOC delivery has on the creation of the learning community and student engagement.

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MOVING BEYOND ACCESS: DISTANCE EDUCATION AND CAPACITY BUILDING

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Background to the Study

Distance education as a field has strongly been associated with providing students access to education. Indeed, different terns have been used for decades to connote and promote the access advantages of DE, including *flexible* and *distributed*. Currently, the word *open* seems to be ascendant, with the growth and success of open universities, the immense popularity of massive open online courses, and the general enthusiasm for open educational resources. In all these senses, openness is strongly associated with providing students access. Yet, as we move beyond the idea of openness and access, people in the field of DE are increasingly questioning the accomplishments and goals of DE. Weller (2014) argues openness does not feel like victory and is not adequate enough as a goal. Tait (2008) questions what distance education and open universities are for, beyond just providing access.

Access has historically been the raison d'etre of distance education in response to demands for more equity to education (Keegan, 1996; Peters, 2004). Implicit in these ideas of equity are conceptions of justice: how can DE help foster equity and justice in society. Understanding justice involves "understanding and interrogating how different individuals and groups are faring in comparison with others in a specific context" (Wilson-Strydom, 2015; p.145). There are specific approaches to thinking of justice that have tangible implications for distance education.

Three Conceptions of Justice

Broadly speaking there are three major conceptions of social justice that often manifest in education literature. Justice as fairness for individuals, justice as fairness for groups, justice recognition and representation and justice fostering capabilities.

The most common conception is Rawls' (1971) perspective of justice as fairness. Historically and legally many perspectives on justice are based on some conception of human rights or human nature. Rawls' articulates an approach to justice based on an idea of fairness. He argues that our individual positions in society are the result of a "natural lottery", which is his shorthand for our social and genetic inheritances, and our surroundings. Our position as individuals in society is quite arbitrary yet leads to uneven access to resources and opportunities. In many cases, this uneven access is stems from an inequality (based on several variables such as gender, ethnicity, class, location, age, ability, etc). Rawls argues that from a justice perspective "inequalities are just only if they are of greatest benefit to the least-advantaged members of society". If inequalities do not benefit the least-advantaged they are unfair. Any person or group (e.g. educational institutions) advocating for justice as fairness, needs to make a concerted effort to make resources and opportunities available to less advantaged members of society. In the case of distance education, has historically manifested in efforts (e.g. policies, design, supports) that allows access to DE programs for learners who encounter numerous obstacles to education. This includes adult learners who lack flexible hours to access educational programs. This includes people of from rural areas who are able to physically access educational institutions in a regular basis.

Young (1990) moves away from a focus on individuals to a focus on groups. She states that structural inequalities are encountered by particular social groups. For Young, focusing on the group allows for seeing sources of oppression and domination. These sources are not addressed by merely addressing access issues. For example, Kramarae (2001) discusses the challenges of women learning online who are third shifters. Their first shift is as workers. Their second shift is as parents. After all this, they are able to be DE students, during their shift. A Young perspective on social justice would require awareness of and policies for supporting such third shifter students. This may manifest in policies, student support and course design in DE programs.

More recently, Nussbaum (2011) builds on Sen's ideas (1985) that a perspective of justice should move beyond access as the focus. Justice needs to focus on the extent to which people are able to live more freely, which is made possible partly by increasing their capabilities. Any initiative should be judged by how it helps to foster these capabilities. In the case of DE, this means moving way from just the number of people who are participating in a program or promoting open entry policies, important as these are. It is also about the educational policies, supports and experiences that enable students' success in their academic careers and their ability to make an impact in society.

Purpose of the Study

Based on these different approaches to justice in distance education, the goal of this study was to focus on how DE institutions are moving beyond providing access and toward building students' capabilities and society's capacity. Given this interest, the research question for this study is:

- How does distance education move "beyond access", and provide capacity building to students?

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Research Design

This is an exploratory study for defining *beyond access*, *students' capabilities* and *capacity building* within distance education. A starting point for the survey was Tait's framework (2013), about a capabilities approach to defining the mission of open universities. In it he identifies three areas of focus for a capabilities approach to DE:

- access and recruitment policies;
- programmes of study offered;
- learning, teaching and student support.

Sampling, Data Collection and Results

These areas formed the categories of survey that was piloted in two universities with strong DE experience, one in the United States and one in Europe. The survey is currently live and there is not yet a final number of participants.

Exploratory factor analysis and correlations were used to identify key categories that are salient for DE institutions to consider if there is in moving beyond access.

Significance of Study

Many institutions are asking how DE completion rates can be increased and how DE programs can be more successful. As distance education continues to grow and there is increased interest by governments and other agencies to identify the social impact of DE (Sangra & Bates, 2011). This study begins to develop categories and an analytical tool for addressing these issues. As such, it will be one of several studies to investigate if and how DE can move beyond an access focus.

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TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) CASE STUDIES FOR EXEMPLARY MATHEMATICS TEACHERS IN LOW SES SCHOOLS

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Abstract

This paper is a research in-progress project that has two major aims. The first is to investigate technological experiences of secondary teachers, when they teach in a multicultural school with low socioeconomic status, about their views and experiences pertaining the role of technology in teaching mathematics for their students. The second aspect attempts to explore teachers' view on importance of using technology in mathematics education and how they perceive social equity aspects.

Introduction

The relevance of bringing relevant pedagogy into classrooms has been long time considered by numerous researchers (Ladson-Billings, 1995; McLaren, 2006), and its principles were largely accepted by educators to help them guide in achieving an adequate balance between wellbeing and knowledge for all of participants of the educational processes. Several studies show the importance of equity in mathematics education (Brantlinger, 2005; Gutstein, 2006; Tutak, Bondy, & Adams, 2011; Valero & Zevenbergen, 2004), in contrast with what normal educators would perceive mathematics as a neutral area. Educating mathematics teachers in order to help them lay into practice notions of social justice becomes an important objective (Gates & Jorgensen 2009) and technology has its important role. Because of the increasing number of years of schooling, and high school becoming mandatory, mathematics education no longer targets only intellectual elites. Furthermore, computers offer an environment that allows a dynamic context and lets instruction become more engaging and interactive (Kaput & Shaffer, 2002).Becker and Ravitz (2001) surveyed 1,215 schools with 4,100 mathematics teachers of grades 4 to12 to see patterns and frequency of using computers. The results show that, during 30 weeks, only 11 percent of participants reported using computers more than 20 times. Even in these cases, the use of computers was for playing games, typing in word processors, or reading materials from CDs. As well, pedagogy is changed, as computer technology is involved to explaining, testing, and giving feedback to students.

Mathematics teachers often invoke the role of technology in motivating their students in learning mathematics. Therefore, integrating technology in mathematics education becomes essential to motivate multiple categories of students. Thus, through participant narrative, the specific objectives of this study are to: (a) Identify ways of using technology in mathematics education classrooms in a multicultural school with low economics status (b) Identify whether various identities are included and/or excluded/silenced in the process of integrating technology in secondary school contexts and to what extent (c) Identify systemic aspects and structures, including policies, pedagogies and practices that reinforce or perpetuate this inclusion/exclusion (d) Explore teachers' opinions about their views of integrating technology in mathematics education (e) Use the TPACK framework in order to describe the expert teachers in low SES schools.

Significance of the research project

Introducing technology in mathematics education has received mixed reviews (*Stoilescu, 2015*). On the one hand, researchers saw integrating technology as an opportunity to make mathematics more accessible for various social categories of students (Kaput, Hegedus, & Lesh, 2007; Aggarwal, 2011). On the other hand, studies have shown that technology as amplifying social pre-existent inequities (Brantlinger, 2005; Garii, & Rule 2009; Garii & Appova, 2013; Gates & Jorgensen, 2009). For instance, it was noticed that students from poor economic background have during their classrooms only exercises that emphasize low skills and rote memorisation. First, researchers mention that often teachers in these schools are not adequately trained or are from the minorities themselves. As well, researchers mentioned that often technology is only introduced only perfunctory, without adequately attempting to redesign or reshape it later based on local feedback. As well, studies pointed out that students uses only some editing software such as PowerPoint and the technology is used only occasionally and is not specially designed for mathematics classrooms. Other studies show that the computer technology in poor communities is often obsolete or the adequate educational software with missing from these schools. On the contrary, some research shows that often, in affluent neighbourhoods, technology used in classrooms has complex roles and is creatively used by educators and their students.

Technology was often seen as a factor in gender inequity. This aspect remains valid in mathematics education. For instance, Assude, Buteau and Forgasz (2010) show that female students are at disadvantage. As well, Stoilescu and his collaborators (2009, 2010, 2011) found that although female students have formally received computer resources, in fact they do not have access adequate instruction of learning computers in a creative way. Apple (1988) emphasized that in spite of educators' attempts, in the mathematics curricula, gender inequalities are prominent. In addition, he asserts that the inequality is amplified with the integrating technology in mathematics education. As Jorgensen, Gates and Roper (2013) pointed out, in mathematics classrooms "it is therefore important to consider not only the concepts but also the medium of instruction. In many disadvantaged communities, the clash between the culture of school and the culture of learners contributes significantly to the failure to experience success of many learners" (p.8).

This is why I believe that this study can be performed and is welcomed in many schools from the Greater Western Sydney. Ascertaining whether integrating technology in mathematical

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education contexts is perceived as more problematic because of the social construction of technology and mathematics in today's educational context, or whether this apparent objectivity renders educators perceptions as totally insignificant and unproblematic, allowing them to be honest and open about their own challenges, views, would provide another significant addition to the research in the area. Furthermore, it will extend on the research in relation to choosing the technology and the adequate ways of using it. Although, secondary teachers in various situations are required to implement strategies to integrate technology in mathematics education, there is a need to examine the equity aspects of the locations in which the teachers are positioned, in order to see how they are impacted upon by various subjects and how they impact themselves in other students' preparations. Consequently, the discourses in which the integration technology in secondary mathematics takes place will be explored in terms of pedagogical discourse and equity.

Moreover, an analysis of the discourses that operate in relation to their broader professional experiences will also be undertaken to develop an understanding of the in/visibility equity in mathematics in settings from the participants' perspectives. There were different perspectives of using different theories. By using Foucault (1997) perspective, I will explore how power shifts and is contextually located, depending on the discursive positions in which the actors are located and how this persuades on the power an educator has at different times, in various contexts. Thus, this proposed research is not only well-timed but important in its pursuit to address these gaps in the current research. By drawing on the voices of secondary teachers, living and working in a multicultural Australian community, these much needed case studies of professional experiences of secondary educators will be ascertained. I believe that the intersection between social justice, mathematics education and educational technology is a research niche that offers many satisfactions not only for me, but for many educators and administrators. This will provide a foundation on which further critical research may be conducted on teaching professional development and social justice issue and weave knowledge gained in past research as well as contributing to future research plans. For example, the information achieved from this study will directly enrich my previous doctoral research, and be used in publishing articles. In this case, comparisons, contrasts and links could be developed between the experiences of mathematics education, educational technology and social justice. So far, I have published several articles on each field. As well, I wrote articles on intersection of these domains and, in one of the articles (Stoilescu, 2009) I attempted to pursue the intersection between these three domains. This research is linked with this article and has many ideas already developed from this article.

Methodology

This study is a qualitative research. I will select five teachers from two schools. I will combine case study with ground theory. In the first stage, I will study each teacher separate and construct an individual case study. In the second stage, I will do a cross case analysis to see common aspects and differences between the five teachers. In the third, I will try to redesign the TPACK aspects of using the TPACK framework and prescribe ways of efficiently using the

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framework, by using the grounded theory (Charmaz, 2008). A mentioned before, the main criteria for selecting the schools and the teachers is that they represent a community with an ethnic diversity and a low socio economic status. The two secondary schools selected in this study are from the Greater Western Sydney which has a great number of new immigrants, both from working and middle class. I will look for secondary teacher who have at least five years experience of working in secondary education and are regularly using technology in their mathematics classrooms.

Data will be collected from observations in classrooms, document analysis, and interviews. I will stay in the school for approximately two months, in each week I will stay at least 4 hours for each teacher. Field notes from mathematics classes on the integration of technology in classrooms will be recorded. The TPACK of each teacher will be described. I will review the curriculum documents about secondary school mathematics from New South Wales. Each teacher will have two individual interviews designed to explore their attitudes and views about the use of technology in classrooms. The interviews will provide data on the teachers' background and previous educational and technological experiences. Teachers will be asked about their overarching reasons for adopting technology in the class, their opinions about their students, their personal reasons for integrating technology in mathematics, the personal motivation that made them choose to teach at that specific school, and their perspectives on the integration of technology in mathematics classrooms. Also, I will include questions about recent experiences that were observed in classrooms in order to identify how these events were perceived by them and eventually to discuss eventual differences.

For the collection of the data, interviews, observations and text analysis will be used. Interviews will be audio-taped. The time and place will be negotiated with the participants at a mutually convenient time. I will use an informal, semi-structural approach. Observations will be done in the classrooms. I will observe what the technology in place is. As well, I will notice how the technology is used in classrooms and how the students and the teachers' comments on it. Several key questions will be asked including:

- What is their opinion about the use of technology in mathematics classrooms?
- If and how do they use technology in mathematics education in their classrooms?
- How can the TPACK be described?

Data will be collected from interviews and observations will be coded and analyzed with NVIVO. For credibility and validity, Lincoln and Guba (1985) recommend pursuing the following main aspects: prolonged engagement, persistent observations, structural corroboration, referential adequacy, member check, and triangulations. Prolonged engagement were attempting to overcome possible distortions presented by the researchers' presence and to test their perceptions, biases as well as those of their participants. By extending my presence in the researched classrooms, teachers became used to my presence and confident that this study was not critical of their teaching approaches and classroom interactions. Persistent observations will identify pervasive characteristics from atypical ones.

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I use distinct types of triangulation recommended by Patton (2005): data triangulation and triangulation through multiple analysts. For data triangulation, I will check to see if information from different sources of data (interviews, meetings, field observations, paper and electronic documents) confirmed each other. For multiple analyst triangulation, I will discuss the analysis of data and the findings with a research assistant as they will help me analyze the data or will be asked to co-authored some articles and conferences linked with this research. In addition, I will discuss the findings with a research assistant. The accuracy of the data will be analyzed as a preliminary step. As with any qualitative research, the process of analysis will be on-going (Bogdan & Biklen, 2003). I will take the transcripts from initial interviews and observations, and will start the process of coding. I will create a set of codes based on my findings.

Conclusions

Introducing technology in mathematics education has received mixed reviews. On the one hand, researchers saw integrating technology as an opportunity to make mathematics more accessible for various social categories of students (Kaput, Hegedus & Lesh, 2007; Stoilescu, 2009; 2015). On the other hand, studies have shown that technology as amplifying social pre-existent inequities (Brantlinger, 2005; Garii, & Rule 2009; Garii & Appova, 2012; Gates & Jorgensen. 2009). For instance, it was noticed that students from poor economic background have during their classrooms only exercises that emphasize low skills and rote memorization. First, researchers mention that often teachers in these schools are not adequately trained or are from the minorities themselves. As well, researchers mentioned that often technology is only introduced only perfunctory, without adequately attempting to redesign or reshape it later based on local feedback. As well, studies pointed out that students uses only some editing software such as PowerPoint and the technology is used only occasionally and is not specially designed for mathematics classrooms. Other studies show that the computer technology in poor communities is often obsolete or the adequate educational software with missing from these schools. On the contrary, some research shows that often, in affluent neighbourhoods, technology used in classrooms has complex roles and is creatively used by educators and their students.

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ENHANCING 21ST CENTURY SKILLS IN A REGULAR UNIVERSITY COLLEGE SETTING THROUGH BLENDED LEARNING

Sofie Vanmaercke, VIVES University College, Belgium

Introduction

During the academic year 2010-11, VIVES University College Roeselare Campus has temporarily closed down its PDCA operation – *We stopped the line, 'cause it was important* – to consider in depth our view of the future of higher education in Roeselare.

During the current academic year (2015-16), our new view on education has led to the implementation of an educational concept in the three years of bachelor's nursing course, which has been revamped to reflect a fresh view of teaching and studying in the 21st century. This is how we aim to meet the fundamentally different demands made on employees and thereby on higher education by today's knowledge and innovation society.

I hope to present this new educational concept at the EDEN congress in Budapest. On the one hand, I want to inspire other institutions in their quest for modern and effective higher education, whilst on the other hand I'm looking for the necessary feedback to help us refine and optimise this concept even more.

Theoretical framework

To say that society is developing and innovating like an express train is merely stating the obvious. The classical-methodical education model dates from the industrial age when there was a need for a lot of people who possessed the same standard skills so that they could all do the same work. In today's complex society, professions are changing faster and faster, the range of profiles/positions within a profession is increasing all the time, and we are also seeing the emergence of more new professions and positions. Virtually all repetitive processes are being replaced by ICT based applications. Employees are expected to continue working on their professional development and learn to cope proactively with change. They are expected to make knowledge their own and be able to apply this knowledge autonomously in new situations.

> *"I'm calling on our nation… to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st century skills like problem-solving andcritical thinking and entrepreneurship and creativity" (U.S. President Barack Obama, March 2009)*

In 2008, Jef Staes described the motor behind this process of change as a "passionate tango of information and innovation". In his view, what is happening all over the world is that people powered by Internet and ICT are using information wholesale for innovation. These innovations have led to a considerable increase in information. In turn, the new information is applied again for the purposes of further innovation, and so on. This ever faster cycle leads to a constantly growing flow of knowledge. Whereas, in 1900, we still needed 100 more years to double all common knowledge, researchers estimate that this figure was still 25 years up to World War II, five years in 1998, and just one year in 2013 AD. According to IBM, our knowledge in the near future will double within 12 hours (Fuller, 1982; Schilling, 2013).

Dealing with complexity

New research insights, innovative nursing procedures and operations, and changes in the organisational structures in the sphere of work are some of the items covered in the course material. Lecturers, rightly, want to update their lessons as much as possible. However, this leads to a considerable increase in the course material. Enquiries in the VIVES Roeselare Campus copying service have shown that on average the courses are becoming 10% more extensive *each year*.

The constant expansion of the course material means that timetables are full to overflowing. More and more classes have to be given, and this puts even more pressure on both students and lecturers. However, it also means that students have to process more knowledge so that their essential basic knowledge becomes increasingly snowed under.

The endless growth in knowledge in the curricula is *not a good way* of dealing with the growing complexity.

Where is education going?

More than ever before, people are scrutinising higher education to see how students are equipped with a tool box to meet the demands of the sphere of work. The sphere of work is crying out for employees who can adapt properly to the rapidly changing working environment and have mastered competencies instead of falling back on isolated knowledge and skills.

Instead of an arsenal of ready knowledge (which can be acquired simply via Google) we particularly want to develop applied knowledge and the students' meta-cognitive skills, thereby concentrating on a smaller, yet more effective body of knowledge: investigative learning, active learning, critical reflection, creative thinking, self-discipline, and problem-solving teaching are skills which are absolutely essential to today's students if they are going to achieve much in the present innovation economy. Terms such as *21st century skills*, *lifelong learning competencies*, or *core competencies* are largely comparable to each other in this respect and are largely interchangeable.

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This is how we teach students to develop their own systems of knowledge so that, armed with a sound basic knowledge, they themselves learn to deal with the complex knowledge society in which we live. In this respect our approach is closely related to the constructivist learning theory.

Constructivism and blended learning

Over the last decade, educational neuroscience has provided a lot of empirical support for the constructivist educational model. It has emerged from brain research that the brain is capable of adapting to changing circumstances time and time again. This means that the brain (influenced by the environment) can learn new things again and again and therefore become more intelligent. Neuroscience has shown that brains do not so much *store* knowledge as *construct* it (Crone, 2012; Jolles, 2012).

Although traditional classical-methodical education does not meet the demand for proactive and versatile employees, this does not mean that this model is no longer valuable. A sound body of knowledge is still vitally important, but the traditional monolithic approach to education needs to be broadened from a simple (classical) didactic approach to a combination of various didactic strategies i.e. a mix of methodologies (blended learning).

The term *blended learning* is a container concept and covers a loose range of different connotations. The question of definition is expressed most clearly by Oliver and Trigwell (2005), who state that in many cases the concept of *blended learning* can be defined as a *mix* of learning with and without technology, in which a more precise demarcation and expression is not given. Furthermore, they also encounter other definitions. As part of their analysis, they consider the three most common definitions of blended learning:

- The integrated combination of traditional education and *online* education.
- The combination of tools and media in an e-learning environment.
- The combination of didactic strategies, irrespective of the use of technology.

The authors point out that it always involves the combination of all sorts of items (technology, types of instruction, basic principles of learning theory, or didactic strategies). At the same time, they also find that *blended learning* means different things to different people and is interpreted differently.

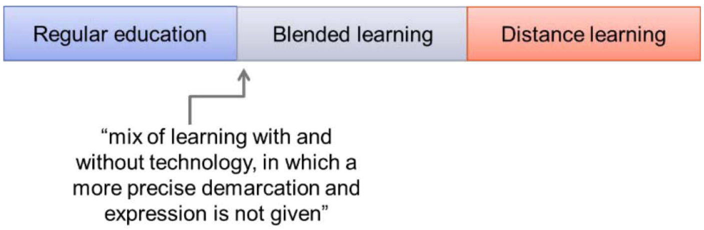

Figure 25. Spectrum of blended learning versus regular education and distance learning

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Most forms of blended learning are associated with distance learning. The interpretation at VIVES Roeselare lies on the other side of the spectrum and closely resembles regular education (Figure 1). As a definition, our interpretation most closely resembles "the combination of didactic strategies, irrespective of the use of technology". This mix of didactic strategies consists of lectures, (inter-) active lectures, and guided private study through e-learning.

Blended learning

Currently, after years of intensive preparation, we implemented blended learning in the three phases of the bachelor's nursing course at VIVES Roeselare. This meant a radical didactical change for the lecturers. Whereas tuition had previously consisted entirely of lectures, the number of lectures has been halved. The remaining number of contact hours has been restructured into 25% (inter-) active lectures and 25% guided private study through e-learning.

Lectures

As in the past, lectures serve to build up the students' body of knowledge. A sound body of knowledge and skills training still constitute the foundation for training students to become competent professionals.

According to Mink (2008), a lecture has three inextricably linked objectives:

- A conditional function: A lecture motivates students and stimulates their interest in the teaching content.
- An orientational function: A lecture informs students about the teaching content, outlines the main points, gives examples and clarification, increases student insight into the teaching content, and structures the teaching material.
- A practical function: A lecture provides an opportunity for the lecturer to ask questions, give assignments, and improve assignments.

Guided private study through e-learning

After a lecture in which the lecturer has applied the necessary attention to an item of teaching matter, the students prepare themselves independently for the (inter-) active lecture. We use the concept of flipped classroom. The preparation often consists of studying an item of teaching content independently, but it can take on a different form as well, such as reading a foreign language scholarly article, interpreting research results, or watching a film. The teacher uses screencasts with different purposes: to explain a difficult subject, to stress the importance of certain items, to make sure the task given is clear, etc.

Students are provided with all the learning material (documents, power points, and photographic and video material) through the VIVES Learning Management System (Toledo/blackboard). They are free to prepare for a (inter-) active session individually or in

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groups. The university college provides the necessary rooms for group preparation, but remote teamwork via the social media (synchronously or asynchronously) is equally possible.

After having studied an item of teaching material or having completed an assignment, students can use the self-assessment programme on Toledo to do a personal test to see if they are ready to go to the (inter-) active lecture.

(Inter-)active lectures

In a lecture the lecturer is the instructor and the role of the student is usually limited to passive listening and taking notes (Thomas & Bellis, 2008). The focus is mainly on increasing the student's theoretical body of knowledge.

In a (inter-)active lecture the focus is on the student to learn and the lecturer is there mainly to supervise the process. The focus is on processing knowledge and how to apply it in practice. The working forms are chosen in accordance with the meta-cognitive skills at the heart of the (inter-)active lecture.

The students work on authentic practical situations in which they are stimulated to develop their own lines of reasoning, try things out, and experiment. It doesn't matter if they make mistakes, provided that they learn from their mistakes.

The working sphere in the school

To make these authentic practical situations even more real, the students work with HFPS models (High Fidelity Patient Simulators). In a purpose-built hospital room, students come into contact with lifelike situations to which they have to react. This teaches them to deal with problems, reflect on their own actions, work together with colleagues, and other disciplines. After having completed the scenario, the group of students dwell upon their own actions and those of others, thereby guided by a facilitator. The scenarios become more involved with each new training phase.

Evaluation

Sergiovanni and Starratt (2007) have stated that evaluation is often viewed as *the tail that wags the dog*. What they meant was that "what is assessed is what gets taught, which becomes or defines the curriculum". Evaluation should never be something that takes place after the instruction with a view to obtaining a certain grade, but should be a relevant part of the teaching process.

In lectures the (main) focus is on the development of the body of knowledge and thereby the more basic cognitive skills (remembering, understanding, and applying). In (inter-) active lectures the (main) focus is on the development of the more advanced cognitive skills (analysing, evaluating, and creating). For this purpose we have used the taxonomy of Bloom, revised by Krathwohl and Anderson (2001).

Depending on the proportion of lectures and (inter-) active lectures, a testing matrix is drawn up for each subject in which the more basic cognitive skills versus the more advanced cognitive skills are reflected in the examination questions.

Quality assurance

The time which students spend on guided private study is monitored via a registration system. This data is passed on to the lecturers so that they can intervene, if necessary. There are also focus discussions each month with a small group of students in which the students' experiences, concerns, and comments regarding the blended learning concept are considered in depth. Finally, the director of training regularly attends the lecturers' (inter-) active lectures.

We are well satisfied with the initial results. The students are extremely enthusiastic about the methodology and they themselves have said that they are able to process the teaching content more thoroughly. They are the ones who have asked for major challenges in the (inter-) active lectures, although they do also ask for the pressure of work (private study) to be monitored properly.

The lecturers find it more pleasant to work in the (inter-) active lectures with a group of *prepared* students, who give more abundant answers. They do comment that giving and preparing (inter-) active lectures demands all of their didactic competencies.

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THE E-CAMPUS-PROJECT – THE TRANSFORMATION OF A STUDENT ADMINISTRATIVE TOOL INTO A PERSONAL LEARNING ENVIRONMENT

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Introduction

In 2010, Mid Sweden University decided on an educational strategy for the coming years 2011-2015, prolonged to 2017 (Dnr MIUN 2009/1671), in which e-learning was established as one of two main areas for strategic development. According to the strategy, the university would be active in developing practises and methods for e-learning. E-learning should be a part of the educational activities carried out on campus as well as a part of the courses given on distance.

Furthermore, the complexity of the different technical solutions for e-learning at the university should diminish and the support and maintenance should be more efficient. An important part within the framework of the strategy was that Mid Sweden University should have a presence on the Internet that could be understood as a *digital campus* or an *e-campus*.

The *e-campus-project* started in 2013 with the ambition to build an e-campus for students. This digital environment would be organized around the existing student administrative tool *The Student Portal*. Together with a new personalised interface the portal would be developed towards potential integration with other learning resources and learning support services located on the university websites, including the university library services, as well as the learning management system Moodle and GoogleApps licensed to the university. Functions for personalised schedules, possibilities to access transcripts of learning achievements and functions for course registration as well as resources for booking rooms for group work should be easily accessible. Students should have the possibility to easily communicate with each other and with their teachers via group or programme sites and messaging systems.

Also, based on the increasing adoption of smartphones and iPads, the demand for mobile access to this new environment was obvious. The new environment should therefore have a responsive interface, i.e. depending on what screen the learner uses to display the information, the basic interface changes to better deliver the information and the functionality respectably. In conclusion, the possibility to transform the existing environment into what has been called a Personal Learning Environment (PLE) is present and vital.

The aim of this poster is to further the discussion on the concept of PLEs and the different solutions for digital learning environments among universities by presenting the key elements of the personalised and responsive interface in this still ongoing project. The poster will give an overview of what functionality is present in the digital environment and what possibilities exist in the coming steps of the continued development toward what can be defined as a PLE.

Theoretical assumptions guiding the project

The web technologies of the present time together with the diverse plethora of digital applications for mobile technologies offer unique opportunities to design mobile and flexible PLEs for individual learners. Even though the concept of PLE doesn't have a widely established single definition, the common factor seems to be the potential for offering new ways of using digital technology for student-centred learning (Valtonen et al., 2011). PLE:s are otherwise typically described as a collection of different applications, usually web based and collaborative (social), which aims at foster self-regulated and collaborative learning. Whether a PLE is considered a technical solution or an educational concept, it seems that PLEs emphasize personalisation and learner control.

However, as Väljataga and Laanpere (2010) has noted, an environment only becomes a learning environment when the learner wants to carry out a learning task and starts to perceive the resources of the environment, and the potential activities in relation to the resources, for a particular learning project. It is the learning project that gives meaning and awareness to the resources in the learning environment. The learning environment becomes a PLE only if the individual has opportunity to exert control thru design, access, utilization, modification, and can attach meaning to it according to the learning tasks at hand. On the other hand the PLE can be continually influenced by educational authorities and other peers, friends, and colleagues (ibid.).

According to Milligan et al. (2006), the learner who works in the context of a PLE would utilise a set of tools, customised to their needs and preferences. The tools would allow the learner to:

- Learn with other people: managing their relationships with tutors, and peers, as well as form links between contacts who are not part of their formal learning network.
- Control their learning resources: enabling them to structure, share and annotate the resources they have been given along with those they have found or created themselves, or been given by their peers.
- Manage the activities they participate in: providing them with the opportunity to set up and join activities such as study groups, bringing together a specific group of people, together with the appropriate resources.

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- Integrate their learning: allowing them the opportunity to combine learning from different institutions, re-using previously generated evidence of competency or making links between formal and informal learning. (ibid.)

This type of broad conceptualization of a PLE doesn't specify to what degree the specified social, controlling, managing or integrative aspects must be present in the environment but gives a somewhat practical guideline for evaluating (and constructing) an environment consistent with the basic concept of PLE.

From theory to practice

In the case of the e-campus-project all of the diverse possibilities discussed above are not built into one single interface. Still, many of the aspects highlighted by Milligan et al. (2006) have been established or are under development. However, each of the aspects discussed (ibid.) points to quite a few possible paths and choices. To be true to the ideas of PLE not everything should be controlled in detail by the university, rather the environment need to leave some aspects open to the personal taste and choosing of each individual learner. Therefore the goal has been to empowering the students thru establishing a basic set of possibilities and to integrate the learning support services available at the university without limiting the students control or access.

Table 1: Principal aspects of PLE with corresponding resources present in the environment, and resources implemented in the future.

Aspect of PLE	Present resource	Future resource
Learn with other people	Built in messaging system, possibilities to communicate with specific group (class, programme, other group) connected to the mail addresses of the students own choosing.	Instant chatting will be available in coming steps of development. Also a system for notifications showing when new messages have arrived, with the icons placed on the menu.
Control their learning resources	Access to Google Apps with Google Drive, also access to personal file area on the university servers.	Further possible integration with Moodle and portfolio system Mahara.
Manage the activities they participate in	Students makes their own reservations in the TimeEdit booking module for group work sessions in the learning spaces, or in the open Adobe Connect-rooms, or uses Hang Out-sessions in GoogleApps	Further development of personal schedule (TimeEdit) to directly show links to virtual meetings as well as streamed seminars and lectures.
Integrate their learning	Personalised links to the courses (past and present) in Moodle is directly linked into the interface. Sites for programmes and groups with discussion forums and is present within the environment. Transcript of credits and grades are accessible through the interface.	Nothing planned yet

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The key component of this environment is the basic personal menu that follows each student when visiting the different websites (Figure 1). Even though the websites of Service & Support Services, the Work & Career Services and the University Library Services belongs to different organizational departments within the university structure, the students can easily access any of their resources without leaving the environment. At the same time the different departments doesn't need to have two sets of websites – one for students that uses the new environment and one for external visitors – the websites are publicly available, with the personalised menu showing only to students and staff of Mid Sweden university when logged in.

The menu gives access to personalised content and functionality: Each student have access to personal group and programme sites, a personal landing page (containing schedule and events collected from the student's group pages). The menu contains personal links to the specific courses in Moodle that the students follow, as well as to Google Apps, the transcripts of credits and grades (in the system Ladok) as well as integrated functions in the system TimeEdit where the student can book group rooms and see the schedule of courses.

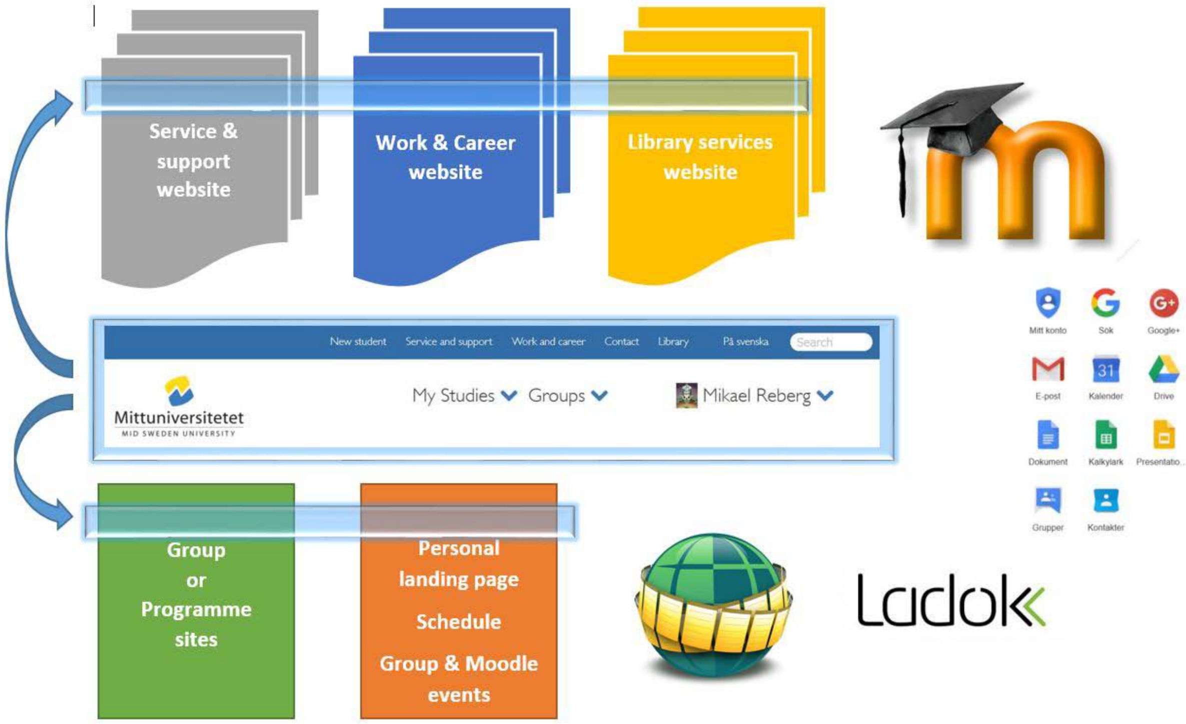

Figure 1. Logic of the basic personal menu. The menu follows the student when visiting different websites integrated with the environment as well as other personalised resources such as group and programme sites, and the personal landing page (containing schedule and events collected from the group pages and courses in Moodle). The menu also gives access to other learning support services as Moodle, GoogleApps, functions in Ladok and TimeEdit.

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DEVELOPMENT OF SHARED KNOWLEDGE IN A VIRTUAL REALITY ENVIRONMENT FOR COLLABORATIVE LEARNING

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Abstract

Virtual reality is now mainly used for gaming or for demonstrating the technology itself. However in the globalized world the development of competitive business skills is crucial. Starting a company requires dedicated skills and it often includes virtual collaboration with teammates or partners. The 3D immersive virtual reality is a field of this collaboration and also it can be a field of training these skills. This paper gives a preview of a training setting designed and conducted in the Virtual Collaboration Arena (VirCA) for the development of business skills. It includes real-time virtual collaboration, information processing, and building common understanding to make the frame of a future business plan with participants represented by avatars in a 3D space. In the further application of this task team mental models can be studied in virtual reality and an applicable virtual training program can be developed. The preliminary results show that the virtual training suffers no flaws compared to the face-to-face condition.

Introduction

The frequent use of digital technologies in workplaces is not a question anymore. The actual question is how technology affects the collaboration among team members. The process of collaboration and the outcome is related to the shared knowledge in the team. The overall goal of this research is to study the effect of virtual reality on the development of team shared mental models about the task. Specifically this paper presents a demonstration of a virtual training for business skills required in founding startups. We used this as the experimental setting to study team mental models in the research what are crucial in effective teamwork.

Collaborative virtual reality (VR) is not used frequently for workplace applications yet. It is rather applied to scientific research on enhancing the technology and the design of such 3D spaces for collaboration as it is done in our previous studies (Hámornik, Köles, Komlódi, Hercegfi, & Izsó, 2014; Komlodi, Hercegfi, Koles, & Hámornik, 2013; Komlodi, Jozsa, Hercegfi, Kucsora, & Borics, 2011; Persa et al., 2014). The next step of research on virtual collaboration is to represent an existing business problem and design a solution in VR. In this case, the training of people for working in teams remotely in virtual spaces is combined with a classical workplace training situation. The VR is not just a tool to make the training easier but it is a part of the future "workplace" of the teammates. The key concept in team-working, including virtual teams is the initial development and further adaptation of shared mental models (Ellwart, Happ, Gurtner, & Rack, 2015). The shared mental model is a shared knowledge and reference system between the teammates. It develops by the team communication, and contains shared representations about the current situation, roles and responsibilities, and the competencies (Cooke, Salas, Cannon-Bowers, & Stout, 2000).

The virtual training demonstrated in this session is targeting the future founders of startups. In the world of innovative small companies usually the members of a team are representing various professions. Startups by definition consist of interdisciplinary teams collaborating intensively not just in an office but working in virtual teams globally. Technology is important in a startup and teamwork plays a key role in the long-term success. Aside from technology, effective collaboration of the team combined with the right timing of the product launch is the keys of success on the long run. The technology is a tool to establish the common understanding of tasks, goals, roles, and knowledge in the team. This is contained by a shared mental model in the team so the startups not only require trainings on technology but on collaboration, learning and techniques to develop shared mental models.

The research to be presented was conducted in Virtual Collaboration Arena (VirCA) which is an open and modular virtual reality management software. It was developed by the Cognitive Informatics Research Group at the Computer and Automation Research Institute, Hungary (Baranyi & Galambos, 2011; Galambos et al., 2015). VirCA is designed to support collaborative work in virtual environments (among several other features) that is suitable for e.g. collaboration in simulated tourist offices combined with the measurement of physiological data (Hámornik, Köles, Komlódi, Hercegfi, & Izsó, 2014; Hámornik, Köles, Komlódi, & Hercegfi, 2014; Koles, Hamornik, Logo, Hercegfi, & Tovolgyi, 2014) or the remote controlling of robots (Galambos et al., 2015). The paper presents a longer (2 hours long) training task for teams in virtual reality that includes individual and team tasks and measurements of shared team mental models.

Collaborative learning task in virtual reality environment

In the experiment two collaborative settings were used: a virtual and face-to-face. The collaborative learning training took place in the VirCA, with three people in different predefined roles working in a team. They were represented as avatars in a virtual room, where instructions and information were provided on posters (Figure 1). They could communicate verbally via Skype and they had to use jointly editable documents to fulfil the task. The moving and placing of the posters were also capable to express nonverbal communication: emphasis importance or attract attention. Compared to this in traditional face-to-face environment team members worked in the same room and used whiteboard, paper and marker. The information was distributed among then in a printed form. The participants were only allowed to share this information verbally and prohibited to exchange the prints.

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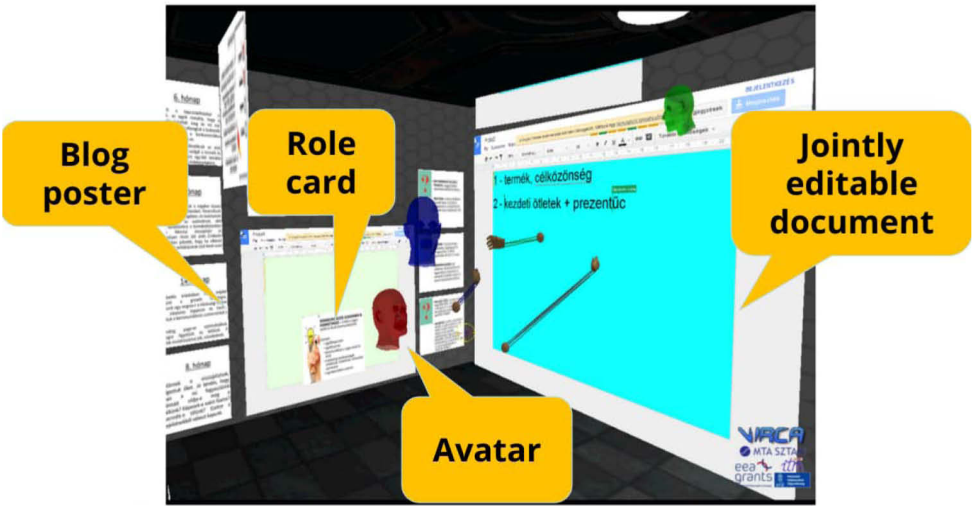

Figure 1. Task design in VirCA

The task of the participants was to create the first 16 months business plan of a brand new startup company based on the information distributed on posters in the 3D VR space around them.

The collaborative learning task consisted of three phases: (a) discussion of team roles, (b) cooperative work, (c) collaborative work. At first phase they had to negotiate the roles in the team in order to complete the task. The following three roles were provided on role-cards: leader, developer, and marketing/communication specialist. In the next phase the team was participating in a task to facilitate collaborative learning. This contained the review of a blog of a hypothetical startup that provided an example for their own plan to have been developed later on. They could use this as a material for their own task. Every person had their own information about the process and had to communicate with the others. Every participant acted as an expert of the knowledge they received on materials. In the third phase the team built its own plan for the startup and noted it on collaboratively editable documents placed in the VR. They completed the task when all the pinpoints of the plan were discussed and written. They had to (a) invent a product idea, (b) define their vision and mission, (c) define the concept of strategy, business model, product map, partners and competitors, customers, (d) figure out product development, (e) come up with a marketing and sales plan, and finally (f) define the team composition. They did not need any additional information to solve the task only what the posters provided in the VR. The features of shared mental models were measured before and after the task on an individual level.

Research questions

We have investigated the characteristics of the collaboration both in traditional and virtual environment. We measured the development of shared team mental model compared between the two conditions. We used test-retest method to evaluate the development of the preliminary mental models to the end of task completion. The questionnaire of the team mental model compared the features of the collaboration (quantity of information, quality of information, characteristics of coordination, roles, the likeliness within the team, team spirit,

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cooperation) in pairs formed iteratively from the three members. We calculated the accuracy and similarity of the shared team mental models within the teams and defined the differences of the two conditions. The accuracy means that the team mental models how precisely maps the startup expert's. The similarity stands for the proportion of overlapping in the contents of individual mental models.

Our hypotheses are the following: (a) The virtual teams' shared mental models do not significantly vary neither their accuracy nor similarity compared to the traditional teams'. The knowledge about the team collaboration is equally similar and accurate in the two different conditions. (b) The collaborative learning task has a significant effect on how the similarity and accuracy of the team mental models develop. We assumed that after the task the team mental models would be more similar and accurate than the initial ones.

Results

The sample consisted of 18 people in 6 teams (mean age was 25.28 years, standard deviation 3.41 years). A team consisted of 3 participants with the roles described previously. Three of the groups worked in traditional setting and three of them in virtual reality.

To measure the similarity and accuracy of participants' shared mental models we used the method of Banks and Millward (2007). First, we correlated each of the collaboration features by pairs with Partial Mantel test in XLSTAT program. From all the correlation coefficients mean scores were calculated according to the teams' study condition (VR v. face-to-face). An Independent Sample T-Test was used to compare the means of the virtual and the face-to-face groups of teams. We found that the two similarity values were not significantly different from each other $t(4) = 0.532$, $p = 0.623$. The mean accuracy of the teams also did not show any significant difference ($t(4) = 1.031$, $p=0.999$). We could confirm our first assumption was proved to be true; the virtual teams' shared team knowledge was as similar and accurate as in the face-to-face condition.

To study how the collaborative learning task influenced similarity and accuracy of the team mental model we have calculated Paired Sample T-Tests and correlated the means' result of the initial and final questionnaire of the team mental model. Our calculations showed that no difference appeared after the collaborative learning task either in similarity ($t(5) = 1.559$, $p = 0.18$) or accuracy ($t(5) = 0.804$, $p = 0.458$) of the shared team mental model. Our second hypothesis was not supported by the data. After the collaborative learning task the team mental model showed no significant change.

Conclusion

The results show that the teams could work efficiently together in both VR and face-to-face conditions. The team mental models developed similarly and accurately. The virtual working teams didn't suffer from the disadvantages of the remoteness and user experience constraints of the technology observed in previous studies of the same VirCa based VRs (Geszten et al.,

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2015). Thanks to the visual and auditory connections, they could process the materials complete task.

Although the task had no influence on the shared knowledge about the team. The descriptions were probably detailed enough to fully identify the main roles and processes to follow. In order to capture a possible effect of the task a less scripted description or a longer and more complex scenario should be used. As preliminary results we have found evidence that the VirCa VR environment could be used as effectively as a face-to-face training setting which is an important step towards to the application of VR technology. Virtual trainings can be a next step from e-learning materials towards a learning environment that could provide more presence and less constraints with incorporating our knowledge of web based learning settings also (Hercegfi, Csillik, Bodnár, Sass, & Izsó, 2009).

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CHANGING LMS: HOW TO MANAGE CHANGE ABOUT TECHNOLOGICAL INNOVATIONS IN HIGHER EDUCATION

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Abstract

Although there is a considerable body of written literature available on how to implement innovation in businesses, and, at the same time, many technological innovations are being applied within the field of learning, we do not find many references to innovative experiences implemented on a large scale among a university's faculty and students. This communication presents the Universitat Oberta de Catalunya's (UOC) experience in generalizing an innovative experience, namely, its new virtual classroom environment, in the Faculty of Law and Political Science.

Introduction: How Innovation Happens

Although there is a considerable body of written literature available on how to implement innovation in businesses and organizations, and, at the same time, many technological innovations are being applied within the field of teaching and learning, we do not find many references to innovative experiences implemented on a large scale within a university and generalized to its faculty and students. Normally, technological innovations are intensively used by a small proportion of the faculty and it is very difficult to generalize them to the rest of the teaching staff. As a result, the benefit that would be gained from their implementation for the other students is lost.

Resistance to technological change is a phenomenon that has been extensively documented in all types of organization (Kotter, 2014). However, certain measures have also been documented that may tend to minimize this resistance: mentoring, training, information and assistance actions are required so that the time and the learning curve required are reduced as much as possible, and the technological change is made as smoothly and comfortably as possible both for the faculty and for the students. However, it is also necessary to articulate the interests of the various agents involved in this technological change process (Callon & Law, 1998), which normally also entails a culture change in the organization.

This communication presents the Universitat Oberta de Catalunya's experience in generalizing an innovative experience, namely, its new virtual classroom environment, in the Faculty of Law and Political Science. In order to achieve this generalized implementation, a series of steps have been followed and a number of specific actions have been designed that have succeeded in progressively integrating the faculty in the new environment, following a user-centred design and continuous improvement cycle (Abras et al., 2004) that has also enabled the virtual classroom environment to be refined. Thus, the needs and concerns of all the agents involved in the change have been taken into account: from the faculty and the e-learning research centre to the faculty and students support services and, it goes without saying, the University's Information Systems.

We will begin by describing the starting point and the context relating to this innovation; second, we will give an account of the actions undertaken to address the change to the new virtual classroom environment; and, to close, we will explain the results that have been obtained with these actions.

The Starting Point: The UOC's New LMS

The UOC's new LMS arises from the need to give greater prominence to the student and the learning activities that he or she completes in the virtual environment during the semester, mentored by the lecturer, within the framework of the European Higher Education Area. Thus, in this context, the activities that were traditionally performed by the teacher are given a lower priority, with greater emphasis now being placed on what the student must do: both educational activities and, in particular, assessable activities. Furthermore, it reflects the ongoing concern to improve our technological environment, which is a key component of our virtual learning model.

From the beginning, this new environment has been endowed with a responsive, customizable design to assist the lecturer in integrating different collaborative and audiovisual tools, as and when teaching requirements dictate. In other words, it is not just a technological improvement for its own sake; the new tools provided in this new classroom enable methodological changes to be made to the courses that will help improve their teaching quality.

Although the lack of success in initial implementation could be attributed to the system's lack of technological robustness – still in a non-stabilized beta version – the classroom stabilization actions only achieved a level of generalization in the University of 44%. However, it should be pointed out that use of the system was purely voluntary and the training actions undertaken were given at the request of interested faculty, which meant that only some faculties had adopted this classroom to a generalized level. Therefore, as a first conclusion, we can say that even though technological change has obvious benefits and no technical drawbacks, it does not take place spontaneously but, on the contrary, requires institutional actions to promote it and ensure effective implementation.

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Managing the Change: Institutional and Mentoring Actions

The first step was taken by Technology at the University, with the intention of fully stabilizing the new virtual environment and guaranteeing routine, incident-free use within the systems.

Once this stabilization has been achieved, the first step in managing change within organizations is always to generate a sense of urgency: it was therefore stated that all the UOC's classrooms had to have the new classroom format by September 2016. Having created the sense of urgency, the statistics in the use of the new environment were reviewed, identifying those faculties where use of the classroom is lowest, in order to analyse the reasons and encourage a large-scale transition to the new environment, accompanied by an action plan to assist the faculty in this change management process. In this case, the Faculty of Law and Political Science was chosen to make the large-scale transition to the new environment, starting in September 2015.

Having decided the participating Faculty, the actions and timeline were defined, identifying those courses that, for technical reasons, could not be moved to the new environment. The actions that were defined are the following:

- Automation of the process for creating the new classroom, so that the lecturer does not have to make any specific request but only needs to configure the classroom.
- Improvement of an existing functionality, the course copy, which drags the teaching content and the learning activities from one semester to the next.
- Design and delivery of specific sessions for each Faculty, including:
  - Demo of the new classroom and its possibilities, and also of the improvements implemented with respect to previous semesters.
  - Explanation of the UOC's educational model and its impact on course design. Beyond the urgency generated, this explanation provides an institutional justification of the importance of the transition to the new LMS, as it is an environment that is directly related with the University's educational model.
  - Practice with each lecturer, where a specific course is moved to a new classroom environment.
  - Workshops on teaching innovation topics that are of particular interest for the faculty, such as the pedagogical use of video, multilingualism and gamification (for which the new environment also offers possibilities).
  - A communication plan concerning the large-scale change to the new environment, and virtual and face-to-face training courses for the entire online faculty.
  - Special technical support for the faculty during the days devoted to preparation of the semester.

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Results

In quantitative terms, these actions have increased the level of implementation from 44% of the classrooms to 64% in the first semester and 86% in the second semester. Thus, only 14% remain out of the total number of classrooms included in the target for September 2016.

Table 8: Increase of the new LMS use by terms

	Total Classrooms	New Classrooms	% New/Total
February 2015	3,191	1,386	43%
September 2016	3,461	2,300	66%
February 2016	3,461	2,992	86%

We are also carrying out a quantitative study with our students in order to measure their satisfaction with this new environment (and these results will be explained at the conference as well).

In qualitative terms, the faculty's assessment is positive, specifically in the following aspects:

- The information and training about the new environment.
- The importance of mentoring.
- The generalized change is made automatically, without any need to make any kind of request.
- The system's stability and robustness, even with peak user attendances at the start of the semester, with few technical problems.
- Receipt and implementation of improvement possibilities, following the continuous improvement cycle and User Centred Design perspective.

It is necessary to continue working on the technical aspects so that all the different types of classroom can transition to the new format, on a pedagogical level as well. Many of the improvements that the new environment may generate will take longer to apply and need more time to be developed (such as the conceptualization of the courses, including innovative practices such as the use of video, etc.).

As a final conclusion, we would stress the importance of designing a change management plan that takes into account the needs and concerns of all the agents involved, both to expedite the process and to guarantee widespread adoption of technological innovations applied to university learning.

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BLENDED LEARNING BEFORE A LEARNING ENVIRONMENT CHANGE: PRE-DEPARTURE TRAINING FOR MEDICAL EXCHANGE STUDENTS

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Introduction

Maastricht University encourages medical students at master level to gain international experience. An Internship in a non-western country poses different problems and challenges for students as compared to the usual internships in the Netherlands and neighbouring countries. Around 150 medical students leave our university to non-western countries each academic year. The aim of the university is to send these students well-prepared to their institutions abroad: The internship on the tropics should be safe for patients, but also for students.

In the past students had to follow an (obligatory) course in tropical medicine. This course focussed on some important tropical infectious diseases and public health aspects, but not so much on personal preparation, for instance safety issues and dealing with cultural differences. Because of a change in the curriculum this module was not obliged anymore. At the same time, the lack of sufficient preparation of medical students for foreign electives was a national topic of discussion. Therefore the urge was felt to develop a new module, which focussed not only on tropical diseases, but could also contribute to personal preparation for foreign electives.

Background information

Master medical students can leave for their internship to various countries in their 1st, 2nd or 3rd year. The pre-departure module should therefore be offered to students at different study levels, but should also be 'time-tailored'. Students need to finish the module just before they leave, so they know to which country they go (just-in-time-learning). As a consequence, students can apply knowledge of the module to their country of internship: contextualisation. This contributes to the well-preparedness of students.

Content of the *pre-departure module*

The content of the module is developed by (tropical) doctors. It consists of the following topics: logistics and safety, infectious diseases, mother and child health, and culture. In Table 1 a brief description of each topic is given.

Table 9: An overview of modules in the pre-departure module for medical exchange students (master level)

Topics of the module	Description of the topics
Topic 1: Logistics and Safety	Students get general information on safety issues.
Topic 2: Infectious diseases	This module focuses on infectious diseases that are more common in developing countries. Personal safety issues with infectious disease are also dealt with in this module.
Topic 3: Mother and Child Health	This module provides information on health issues around reproductive health, pregnancy, delivery and paediatrics. The module invites students to think about specific problems that can be encountered in developing countries.
Topic 4: Culture	It seems obvious that cultural difference can be a source of misunderstanding. This module challenges students to contemplate on this.

Structure of the *pre-departure module*

The structure of the pre-departure module is flexible because of the need of a module for different levels in training of the students and the complexity of different times of departure. For this reason an *open* online module, on a secured platform Blackboard, was chosen. *Open* means that all students of Maastricht University can enrol themselves in the module at any time. The medical students know the obligation of following the module on forehand. Students can anticipate on this. A 3rd year master student might need less time for following the online module than a 1st year master student.

At the introduction page of the module students find basic information about the entire module. The procedure of the module is explained and supported by different files. Rules and regulations are also clarified. After reading the instructions students can start with the online part of the module. It takes about 25 hours to complete the entire e-learning component, reading time of recommended literature included. From the start students follow the (sub)topics of the module one by one. The structure of the modules is fixed. At the end of a topic, students make an assignment or multiple-choice questions. They start with the topic *Logistics and Safety*. By *clicking* students move from one subtopic to another subtopic. Each topic is supported by video clips and literature, but is also differently elaborated. Why? Students have their own ideas about knowledge and learning which influence how they study and learn (Ormrod, 2009). Moreover, students do vary in their thinking activities which they employ in order to learn. In the construction of the module the developers anticipate on the fact of having students with different learning or study strategies. Besides, the module creates an opportunity to formulate personal learning goals.

The topic *Logistics and Safety* is explained by vignettes (real cases). At the end students have to make an assignment in which they explore their external internship country. For the topic *Infectious diseases* the following themes, malaria, tuberculosis and HIV/AIDS are discussed. The focus is on reading literature. This topic is assessed by multiple-choice questions. The part *Mother and Child Health* is mainly supported by visual material (Figure 1).

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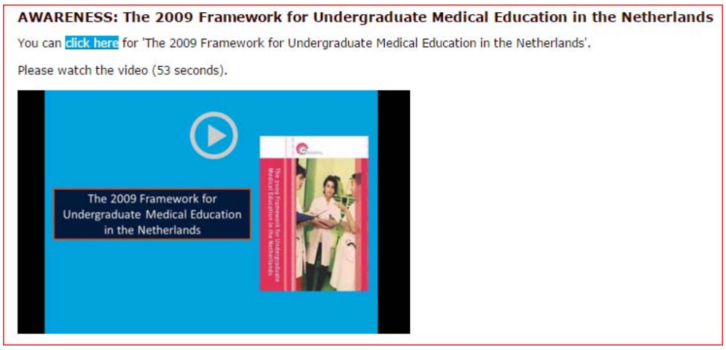

Figure 26. Part of the topic *Mother and Child Health* in which a subtopic is addressed

Also this *Mother and Child Health* topic is assessed by multiple-choice questions. The final topic *Culture* shows cases in which culture has an impact on performance. Students are asked to write a short essay (elevator pitch) on how they would cope with one of the vignettes (real cases) presented.

After the four topics students must sign up for a face-to-face meeting in which the two assignments are being discussed. The assignments are uploaded in Blackboard and checked on plagiarism. The face-to-face meeting is supervised by experts in the field: a safety officer and a tropical doctor.

Blended learning and problem-based learning (PBL)

The blended learning (combination of online and face-to-face education) format, developed for this module, is in line with the educational method of Maastricht University, Problem-based Learning (PBL). Two of the four key-learning principles of PBL are well-represented during execution of the online part of the module: (a) learning should be a self-directed process, and (b) learning should be a contextual process (Dolmans et al., 2005). In the module students play an active role in planning, monitoring and evaluating the learning process. Knowledge gained from the module is applied into the assignments with respect to the specific internship country. The key-learning principles 'learning should be a collaborative and a constructive process' are signified in the face-to-face meeting, after the online part of the module. Stimulated by an experienced trainer, students interact with each other and share understanding of the problems. Moreover, students construct knowledge in these active processes (Dolmans et al., 2005).

Primary evaluation of students (n = 11)

The pre-departure module has started in academic year 2014-2015. Eleven students followed and evaluated the module. The visiting countries for their internship were: India (n = 3), Indonesia (n = 2), Malaysia (n = 1), South Africa (n = 1), Surinam (n = 1), Tanzania (n = 2), and Uganda (n = 1). Six students spent 21 or more hours on the e-learning part of the module. For eight students the structure or the module was clear and 10 students did not have any technical problems. Both following modules, *Infectious diseases* and *Mother and Child Health*, were rated as the most liked modules. It is not clear why they liked these the most. Is it

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because of the health-related content or the structure of the topic of these modules? The topics *Logistics and Safety* and *Culture* were assessed as not difficult. The face-to-face meeting was rated as instructive; it had a surplus value to the e-learning component.

In conclusion, well-prepared students are a necessity for foreign electives, not only with respect to tropical diseases but also for their personal development. Some students stay abroad a longer period of time for the first time in their lives. With this module students can reflect on their own possibilities and needs. Also faculty staff can anticipate on the actuality (context), such as information on the ZIKA virus, directly in the e-learning component or in the face-to-face meeting. This blended learning format provides students the possibility to learn in context before the change in their learning environment.

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IS E-LEARNING AN OPTION IN INCLUSIVE POST-SECONDARY EDUCATION?

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Abstract

Individuals with disabilities in the United States (US) face many of the same challenges including stigma, discrimination, social exclusion and inadequate community resources for rehabilitation and employment (Unitednations.org, 2015). Employment for individuals with intellectual and developmental disabilities (IDD) seems to be a more elusive idea in that individuals with IDD are most often employed part time and are paid a lower wage than their fellow workers without disabilities (Butterworth et al., 2012). This is particularly problematic as employment has been recognized as an important goal for improving the quality of life of adults with IDD (Siperstein, Parker & Drascher, 2013). In an effort to close this disparity, rehabilitation providers need a standardized way of assessing individual client need across different subsystems, as they relate to barriers and resources to employment. With this standardized method, rehabilitation providers will be able to customize services with the goal of improving placement outcomes and reintegrating individuals into the labour market.

The purpose of this proposal is to introduce a new instrument based on the Geist and Calzaretta (1982) Systems Approach to Placement (SAP) model that focuses on assessing the needs of Transition aged adults with intellectual disabilities enrolling in and graduating from an inclusive post-secondary education (IPSE) program. Transition aged adults with ID (N = 85) in a mid-south IPSE program will be assessed to establish a profile of ID clients. Content validity for items will be established by consulting experts in needs assessments and rehabilitation counselling.

Young adults with intellectual and developmental disabilities (IDD) have traditionally struggled with the realities of transitioning to adulthood, particularly as it relates to employment, struggling with greater unemployment and lower wages. Skills related to employability, independent living, self-advocacy, and interpersonal interaction are regularly stressed in secondary special education programs, but are often inadequate to meet all the needs of every student of this very diverse population. Inclusive Post-Secondary Education (IPSE) programs are growing in popularity to address this problem. But building an effective and sustainable program that meets the needs of the local community comes with many challenges, the most salient of which are assessing and addressing students' individual service needs from a systems perspective and preparing students for the social/behavioural requirements of the world of inclusionary work. Fortunately, tools have been developed to address both of these issues. The purpose of this presentation is three-fold: (a) to present a model for IPSE that provides effective and sustainable transition services and vocational training for young adults with intellectual and developmental disabilities addressing sustainability, community outreach, partnerships, research, diversity, and management of a transition focused IPSE program; (b) to present a working model of applying the SAP, evaluating service needs across multiple subsystems to improve job placement of individuals with intellectual and developmental disabilities; and (c) explain the utilization of the PBIS system of interventions in an IPSE setting, where individuals with intellectual and developmental disabilities receive vocational and social training.

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THE BAVARIAN VIRTUAL UNIVERSITY – AN INNOVATIVE APPROACH FOR THE INFORMATION AGE

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Overview

The Bavarian Virtual University (Virtuelle Hochschule Bayern, BVU) was founded in 2000. It supports its 31 member universities in providing e-learning courses for high quality education for a growing number of students of higher education. Nearly 50,000 students were enrolled in courses of the BVU in the academic year 2014/15. The BVU, similarly to its member universities, is almost fully financed by the Bavarian Ministry of Higher Education.

The aim of the BVU is to share academic knowledge and therefore to increase cooperation between its member institutions on the issue of net-based education. The courses offered derive from almost all disciplines. Law, medical sciences, business studies and key qualification courses are the best-represented among them. All BVU courses work completely online, thus facilitating their exchange between the member universities. However the aim is not to replace but to complement the programmes of the traditional universities. Students can earn credit points in individual courses but they obtain their degrees at their home university as the BVU does not offer complete degree programmes.

International perception

The BVU was identified as one of seven particular innovative approaches in higher education worldwide in the *Study on innovation in higher education* of the European Commission (2014) *Lifelong Learning: Higher Education and International Affairs*. In concordance with the objectives of the Europe 2020 Strategy, the report aims in particular to contribute to a better understanding of recent developments affecting higher education and provide evidence of how innovation can support higher education in times of change.

Innovative approach of the BVU

Considering the information flood the networked learner is potentially faced with, the underlying concept of the majority of BVU courses focuses on collaborative tasks and extensive tutoring. The BVU therefore promotes the idea of guided e-learning-courses on a cooperative level between Bavarian universities since it is the continued work and exchange between students and teachers as well as among students themselves that constitute education.

The concept of BVU goes beyond MOOCs: Just like MOOCs BVU courses offer their participants a very high degree of flexibility considering time and place of learning. BVU courses offer different pedagogical approaches: some courses are based on virtual seminars with intensive student cooperation, some are organised as online lectures with tutorials, and some function as virtual laboratories. Yet, in contrast to the unguided learning concept of MOOCs, the key characteristic of BVU courses is that students receive tutoring by academic experts of the subject. Furthermore, Bavarian students do not have to pay any extra fees.

Reasons for this policy are the following: Especially in times of a potential information overload it seems necessary not to leave the learner alone with the material presented but to offer him or her for example guiding questions to texts, collaborative tasks, tests with individual feedback and a forum to exchange information and thoughts and to engage discussion between the participants of a course in an learning environment that is both challenging as well as supportive.

Whereas students participating in MOOCs often claim about the impersonal learning situation, arising from extremely high numbers of fellow learners, students of BVU courses appreciate the tutoring concept the BVU announced as a key feature of its courses. In MOOCs a single instructor has to cope with a horrendous amount of requests, so that, for example, interactive actions such as group discussions are almost impossible as well as getting in-depth feedback. In contrast, students in BVU courses are intensively guided by online tutors – whose education is also financed by the BVU to guarantee the qualified operation of the courses. The acceptance of BVU courses among students is, for one reason, based on the acceptance of the courses at their home university as a contribution to the degree they are awarded.

Beneficial effects of BVU courses for the teaching staff and the institutions that form the BVU are as follows: By integrating BVU courses into their study programmes, universities can enhance their teaching capacities. BVU offers financial support for course development and maintenance (online tutors and necessary improvements) if at least two member universities declare their demand for the course as well as their decision to replace face-to-face teaching by that course. So courses are only developed if the demand is proven. The cooperation of different universities allows teachers to team up with colleagues from other organizations, building networks and learning from each other. Also an elaborate quality management is applied to course development and course operation: It involves peer and student evaluation, training programmes for new course developers and online tutors as well as financial support for the updating of courses.

Summary

BVU provides an example for education-focused cooperation between state funded universities in the German state of Bavaria. The BVU's idea of a productive, cost efficient and innovative approach includes learning between students and between teachers and students in online courses. Above that, the close collaboration across university borders enlarges the

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scope of higher education. This is also due to the fact that the BVU's virtual courses are developed by teachers who also teach courses in classroom in presence. Thus, traditional teaching practice enriches online learning environments and vice versa.

Students most profit from the time and place flexibility of online courses. With the help of BVU courses students have a greater choice of courses (and teachers) than their home universities can provide. Furthermore, students get added value: They develop e-literacy within the traditional curriculum, thus enhancing their employability without additional effort which is of high importance especially in the information age and in the context of lifelong learning.

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DIVERSITY IN LEARNING ENVIRONMENTS AND THE USE OF TECHNOLOGY FOR EDUCATION AT UNAM

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Introduction

The late twentieth century and the 2000s brought with them important changes to society due to three important aspects (Kämäräinen & Streumer, 1998):

- Technological and social: which include the accelerated development of technology – including information and communication technologies – as well as the different ways such technology has transformed people's actions at both the individual and collective levels.
- Demographic: since the increase of wellbeing and life expectancy has generated more lifelong learning needs that consider such extension.
- Industrial and economic: both aspects are directly affected by technology, for instance, in production, distribution and marketing processes, which have economic consequences.

As a result, higher-education institutions are required to prepare citizen with a global conscience who is able to learn by themselves and solve problems collaboratively. Those are qualities that traditional education still doesn't resolve.

The combination of those factors has also driven educators to rethink the way they approach the educational process, to produce their own content and learning experiences, to developing teaching-learning processes unrestricted by time and place, and to generating a variety of content that favour the recycling of educational resources. From this perspective, it is possible to envision the construction of a space for rethinking, reimagining and reinventing flexible learning environments that are capable of preparing each person for effective lifelong learning (Groff, 2013; Kirschner, 2005).

Learning environments

A learning environment is the space and place inner or outer -either formal or informal-, and the implicit qualities and the affective and intangible aspects that factor into a scholar experience for each participant in a learning community (Blackmore et al., 2011).

Kirschner (2005) thinks that learning environments consist of two nested domains. The inner domain is that of knowledge, which consist of the sum of all the knowledge, both specific and general, that is available for teaching-learning tasks about a particular knowledge area. The second domain is that of the task and consists of the activities and conditions that are established for the student in order for him to conduct the learning activity (either individual or collective) with the support of the available knowledge. Both domains constitute the learning environment, which comes into place as students find an enough amount of source and support materials in the knowledge domain. With them, students are capable of construing their own basis of knowledge by means of the activities in the task domain. Within in the learning environment, processes such as the following take place: orientation, which takes place in the knowledge domain and aims for the student to answer questions such as what, when and how an activity should be done; practice, which is developed in the task domain, it consists of the use and application of declarative, procedural, strategic and situational knowledge in order to solve the learning activities; feedback, which brings together the knowledge and task domains in order to find out whether the result of the activities supported by knowledge show the desired effect; and an environment's evaluation as a whole, which takes place at the metacognitive level of itself.

Institutional policies

The factors of change have had an impact in society which is reflected in a number of plans, programs and projects that constitute the institutional policies of UNAM for the development of learning environments. Some of the elements included in this frame are the following:

- UNAM's Development Plan (UDP) 2011-2015, which rules over life at the University during a four-year period, parallel to University's Rectory. There are two programs in the UDP that fostered the development of different learning environments:
  - 1. Improving the quality and pertinence of the students' formation programs at UNAM and increasing equality in the access to those methods, technologies and elements that favour their training and performance. (UNAM, 2011; p.15)
  - 5. Increasing and diversifying UNAM's educational offer, both in undergraduate programs as well as in continuous education, professional updating, and job training by supporting and consolidating online and distance programs. (UNAM, 2011; p.22)
- Proposal for Institutional Development Plan 2015-2019. From this perspective, it is evident that supporting the development of learning environments remains a goal since it considers two important guidelines:
  - 5. Strategic program of diversification and improvement of educational modalities for learning, training and specialization for lifelong. (Consulta PDI, 2016)

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  - 7. Strategic program for the use, application, and development of Communication and Information Technologies in the improvement of the practice and optimal fulfilment of the Universities main functions. (Consulta PDI, 2016)
- Intervention projects through which different learning environments are developed at UNAM.

UNAM learning environments

According to Kirschner's (2005) model, the learning environments generated at UNAM comply with the requirement of a vast knowledge domain, enriched by its educators and researchers, whom nourish the domain with closed and open educational resources, some of which already exist while others are created specifically to that purpose. In addition, the environments include a task domain, which is developed by teachers and researchers alike, as well as by pedagogical consultants who orient the activities according to the type of student that will use each particular environment. With those elements, UNAM has built not only one learning environments but many diverse environments where the processes of orientation, practice and feedback (either guided by a tutor or self-directed with support of the environment itself) take place along different evaluation practices proper to each environment.

Formal programs

Following programs 1 and 5 in the UDP 2011-2015, the distance high school known as B@UNAM was updated. B@UNAM is a learning environment for obtaining a secondary education diploma. It is available for Spanish speakers abroad, as well as for education institutions in across Mexico through a number of institutional agreements (although expanding the program on a national level is currently being considered). The environment is fully online and relies on a model with multidisciplinary courses. It provides feedback by means of tutors and assessors, who are highly qualified professionals in accompanying students during this time, guaranteeing that his learning is effective.

Likewise, there are three considerable types of learning environments at the undergraduate level:

- The first type of environment is constituted by twenty online undergraduate programs, organized within UNAM's Sistema Universidad Abierta y Educación a Distancia (SUAyED), a system which features curricula developed by university schools in the fields of the Arts and Humanities, Social Sciences and Biological, Chemical and Health Sciences. With the help of UNAM's Coordinación de Universidad Abierta y Educación a Distancia (CUAED), the schools develop didactic resources that promote studying. In the 2014-2015 period, around 13,000 students were registered in it.
- The second type is a blended learning environment, which targets undergraduate students who attend schools and faculties occasionally and are mostly supported by

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technology. This model encompasses 22 undergraduate programs. In the 2014-2015 period, over 15,000 students were registered in it.

- The third kind of environment is classroom oriented for the most part. However, it uses communication and information technologies in different degrees.

Lifelong learning

Following Program 5 in the UDP, CUAED provides support to different academic entities at UNAM in developing their particular offers of continuous education or lifelong learning. CUAED's work is grounded on the three kinds of learning environments above mentioned, which are meant to address a number of situations such as: "the new demands for higher education in the context of massification on education; the new demands that result from changes in the contexts of information and knowledge; the new occupational demands; the new demands in the context of development; the new demands in the cultural context" (Educación Continua de la UNAM, 2016.). Nowadays, continuous education or lifelong learning gathers over 1,600 online activities that include courses, postgraduate courses, seminars and workshop while the blended-learning activities add 937. For the last school period, the number of registered participants was of 36,711 in online environments and 33,993 in blended environments.

MOOC

In the case of Massive Open Online Courses (MOOC), courses have been developed under two guidelines:

- *xMOOC* – UNAM has formed a partnership with Coursera, an international organization that offers an educational platform in which educational institutions can develop MOOC. Likewise MOOC were developed for the platforms Miriada X and México X (edX). UNAM has ten MOOC at Coursera, one at MiriadaX and four more in México X. In addition, there are developing 20 MOOC more, seven of which are part of specialization programs for graduate students. The number of participant, both nation- and world-wide, adds up to over 600,000.
- *miniMOOC* – With the participation of different schools and faculties, CUAED has supported the development of miniMOOC through a program called: *Cursos de Cultura General*. Those courses incorporate different areas of knowledge and their goal is "close the education gap between different populations and promote educational equality, to provide a useful educational offer that can be of use in different aspects of everyday life (such as the personal, domestic and professional), and to expand the cultural baggage of the general public." Cursos de Cultura General are self-study courses. In order to take them, it is necessary to self-register, and they address with general subjects that do not belong to any formal education program. As such, they are

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not assigned a value in credits, but they provide badges instead. (Mozilla Open Badges).

Conclusion

As has been shown, UNAM has not remained content with only one learning environment, but has developed different environments according to the needs of their users, the needs of their educational programs, and to the resources available in the schools and faculties responsible for their development and implementation; such environments are organized in the three categories that have been presented above.

While this model allows for flexibility, it is also true that the learning environments always feature the characteristics that guaranteeing their educational quality and functionality.

These environments are the result of UNAM's institutional policies, whose ultimate goals are: to provide higher education, to orient scientific research towards the resolution of national problems, to train professionals and technicians who make contributions to society, to express the national culture of Mexico, and to bring learning to those who are not able to attend to the university campus.

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10 YEARS OF EXPERIENCE IN VIRTUAL MOBILITY: DEVELOPING COMPETENCIES FOR MASTERING THE VIRTUAL LEARNING ENVIRONMENT AND PARTICIPATING IN VIRTUAL MOBILITY COURSES – THE CASE OF DOBA FACULTY

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Introduction

Since 2005, the majority of European countries and regions have been supporting the Bologna objectives and the reform of higher education institutions with mobility being a key factor. However, due to numerous obstacles to physical mobility, recent years have seen a strong development of virtual mobility. Virtual mobility, with the support of learning environment, presents an innovation in mobility schemes to provide students an international experience on-line. Virtual mobility predominantly allows students to gain linguistic, cultural and educational experience, while it also increases their value in the labour market.

DOBA Faculty for Applied Business and Social Studies, Maribor (hereinafter DOBA Faculty) started developing virtual mobility ten years ago. All courses are carried out in the Blackboard virtual learning environment. Course activities are supported with collaborative technologies (other than forums, chats, wiki, OneDrive and Blackboard Collaborate were also used) to encourage participation, collaboration and to maintain motivation. Satisfaction with virtual mobility programmes and developed competencies is measured every year with a survey conducted among students and the obtained results allow us to additionally increase the quality of implementation and thus increase the school's competitiveness. The authors of the article showcase the top advantages and challenges that have been noted by DOBA Faculty students who were engaged in virtual mobility programmes.

Advantages of Virtual Mobility

With interest in virtual mobility increasing, so does the number of studies on this topic. In their study, Beel, Keegen and Zaitseva (2007) analysed two European projects where information technologies were used to help in physical mobility and enable other students to try virtual mobility. Harryba (2013) analysed the experiences with virtual mobility at an Australian university. Woyenski (2014) analysed factors that influenced students' intercultural development and experiences in joining educational mobility. In his study of international learning and diversity, Otten (2003) emphasised that international experiences, which individuals acquire through mobility during their study years, benefit an individual's personal development and employability. Hammer and Bennett (2003) have shown that together with intercultural competencies, which students acquire with virtual mobility, they mostly acquire the ability to understand and respond to cultural differences.

Among the authors who have researched the advantages of virtual mobility, Bijnens et al. (2005) emphasised that virtual mobility can reduce obstacles and help persons with disabilities make use of the advantages of student exchange, while virtual mobility can also be important to prepare students for physical mobility (Op de Beeck & van Petegem, 2007). Reynolds and Bijnens (2006) emphasise that 4 out of 5 students are unable to engage in physical mobility programmes due to social, financial, or other reasons. For these students, virtual mobility represents an opportunity to gain equivalent international experience as well as to increase their knowledge and experience in the fields of information technologies and online learning. If we summarise the most commonly noted advantages of virtual mobility found in relevant literature, they predominantly appear in the form of support for physical mobility, flexibility, availability, acquisition of different skills and the establishing of partnerships.

Supporting physical mobility

Virtual mobility can support and complement actual physical exchange programmes. The elements of physical and virtual mobility are combined in order to enhance the advantages of both approaches to the mobility of students and teachers. The report on the international seminar of the Bologna process (2004) and the challenges of eLearning and distance education shows that virtual mobility should be used to enrich and support physical mobility. Virtual mobility is predominantly intended for individuals who are unable to utilise the advantages of physical mobility. It can also be aimed at individuals who intend to engage in physical mobility and leave to study abroad once they have passed courses within virtual mobility, which mostly relate to foreign language learning and intercultural differences.

Flexibility

Virtual mobility opens new opportunities for cooperation, which would otherwise be difficult to implement. It allows students and teachers to learn or teach in a flexible manner, which is adapted to the individual's needs, at anytime and anywhere. Students can work and study at the same time and virtual mobility is thus an excellent choice for full-time employed students. Virtual mobility allows students to be more independent, which means that they themselves are responsible for their academic performance and the organisation of their learning process.

Virtual mobility thus allows for flexible schedules, while at the same time shortening the distance between institutions. As information technologies begin to play more of an important part in learning, long travelling times, which physical mobility is often subjected to, are avoided, and virtual mobility allows for cooperation that had previously been impossible due to distances.

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Availability

The learning environment is better made available to new, non-traditional publics. To those who are unable to attend lectures on campuses; it is intended for lifelong learning and for international students. The advantages of information technologies make remote regions and individuals more easily accessible (Van Petegem et al., 2004). This enables equal opportunities and possibilities for all and inclusion of all. It increases access to opportunities to gain international experience to people who would otherwise be unable to do so, contributing to the democratisation of learning experience.

Students gain access to experts from other institutions and access to courses, learning materials and resources that are physically located far away from their home country. A more attractive offer is provided by expanding their programmes with courses that are available at other institutions. This encourages the students' autonomy and gives them a broader choice of how and what to learn.

Skills acquisition

Virtual mobility enables the acquisition of new knowledge that is required for today's innovative work methods and business models. It represents practical preparation for new work methods that use videoconferencing, remote computer access and collaborative workspaces. Virtual mobility also encourages students to use the Internet, while all this includes the learning of important skills required for future employees.

Establishing partnerships

Virtual mobility facilitates international cooperation and enables the establishing of partnerships among individuals and institutions. Networking synergies among institutions lead to a higher quality of implemented study programmes of each partner institution and enable higher education institutions to become stronger and more competitive. This also makes those institutions more attractive compared to other institutions that do not offer such programmes.

Challenges of Virtual Mobility

Due to the requirements and conditions that have to be met for its implementation, virtual mobility also brings a number of challenges to its providers. These can be classified into the challenges that virtual mobility brings to teachers, challenges for the students and technical challenges.

The courses that are included in virtual implementation have to be supported by appropriate information technologies. Teachers have to gain specific knowledge in order to be able to prepare the courses that are implemented virtually. The preparation of such courses requires completely different techniques and tools. The courses have to be flexible, as it is important that they can be simply upgraded and changed.

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On the other hand, virtual mobility also brings numerous challenges to students. They have to be familiar with the techniques of online learning, while greater attention is paid to individuals, which is characteristic for virtual mobility, can cause slight discomfort for some students. Students can also have a negative experience due to fewer opportunities for socialising. At the same time, virtual mobility can also represent higher risks of drop-out or premature withdrawal of students before they finish their course. Op de Beeck's (2005) study emphasises the importance of knowing a foreign language as a challenge of virtual mobility, which can be a challenge both for the teachers and even more so for the students. Vrijens and van Petegem (2012) emphasise the main challenge of how to make a student feel like a part of the institution where they are taking the course, as they can be actually taking a course from the other side of the globe.

In regard to the technical challenges of virtual mobility, these predominantly include challenges relating to stable information technologies, system and platform compatibility and consideration of standards. Another important technical challenge is for students to have a functioning Internet connection. According to DOBA Faculty's experience students with little or no experience in online learning needed more support. Students need the tutorial as well as the technical support 4 times more than experienced online learners. More time is also needed to get familiarised with the environment and online learning principles. In case of any technical difficulties, the students can contact the technical support via e-mail, Skype, phone or a special forum in Blackboard.

Virtual Mobility at DOBA Faculty

At DOBA Faculty, virtual mobility was first implement in the 2005/2006 academic year. So far, over 1,600 students from 31 different countries have participated. Virtual mobility is implemented in three forms: within the framework of the virtual summer school, within the framework of international week and within the framework of joint implementation of courses with international higher education institutions.

The virtual summer school

The international virtual summer school takes place in the form of individual and team activities in the Blackboard virtual learning environment and in the form of lectures given by national and international lecturers, which are attended online by all participants of the summer school regardless of the course they have chosen.

Within the framework of a multicultural and multinational group, participating students gain international experiences and competencies from the professional field, utilising the possibilities offered by global communication technologies. Students from across the globe can join courses or parts of courses offered by the School and can have their parent school recognise the completed study obligations.

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The taking of courses via virtual mobility is interesting for students because of three different aspects. First, there are the topical content, the opportunity to exchange knowledge and opinions and the possibility to establish business contacts. Secondly, the mode of implementation (virtual) is interesting and allows employed individuals to partake in the summer school. Another important point is the intercultural aspect and the experience of international cooperation, as part of the programme that is also intended for international students. The interest in joining the virtual summer school differs through the academic years. Below is the trend in the number of participating students in the virtual summer school for the last five years.

Table 1: Overview of participation in the virtual summer school according to academic years; 5-year comparison

Target group	Overview of participation according to academic years				
	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Students	78	287	245	127	179
Prospective students	90	82	55	30	70
International students	74	65	42	115	125
Total	242	434	342	272	374

The number of students participating in the virtual summer school differs according to individual years. The programme of the virtual summer school changes every year, as we offer students and prospective students topical content that is also interesting to the broader public. The number of available enrolment slots in the virtual summer school is limited, we were however able to fill all available slots throughout the years. The only constant of the virtual summer school is the international week, which takes place exclusively in English.

Student success rate in the virtual summer school has been high throughout the years. This is undoubtedly aided by the high motivation of participating students and prospective students, which is usually lower among prospective students in traditional study mode. The table below shows the average success rate of participating students for all implemented courses in the virtual summer school in the last five years.

Table 2: Overview of student success rate in the virtual summer school

	Overview of success rate according to academic years				
	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Success rate	89.3 %	90.2 %	91.3 %	81.6 %	89.6%

The table shows that student success rate in the virtual summer school was high in the five observed years. A slightly lower success rate can be noticed in courses that are implemented fully in English. Interest in these courses is also slightly lower, and judging from the analyses of surveys conducted among the students at the end of every virtual summer school, the reasons lie in lack of knowledge of this foreign language

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The survey

Throughout the years of implementing virtual mobility, a survey was conducted among the participating students on their satisfaction with the implementation of the courses. We also checked why students decided to take the chosen courses in the form of virtual mobility. The results of this segment of the survey are presented below. First, individual key competencies and opportunities resulting from virtual mobility are presented, followed by the main challenges of the implemented virtual mobility. The sample comprises 181 students who took one of the courses offered within the framework of virtual mobility in the last 10 years.

Table 3: Virtual mobility – which competencies do students expect to develop

Students' expectations	Percentage
gain from participation in international teams	12.68 %
improve knowledge of online learning	11.27 %
improve knowledge of information technologies	2.82 %
improve intercultural competencies	39.44 %
improve knowledge of English	33.80 %

As evident from Table 3, the main competencies that students expect from international virtual mobility are the improvement of intercultural competencies and an improved knowledge of English. This is followed by the opportunities arising from participation in an international team and improved knowledge of online learning. We were further interested why students decided to take a course in the virtual environment.

Table 4: The factors that motivated students to join virtual mobility

Students' motivation	Percentage
gain experience in online learning	4.42 %
interesting topic	9.39 %
pleasure	4.97 %
curiosity	6.08 %
international aspect	6.63 %
professional development	4.97 %
personal development	8.29 %
new challenge	13.81 %
development of linguistic skills	8.29 %
gain credit points	1.10 %
gain an advantage in the labour market	1.10 %
development in the field of culture	8.29 %
academic development	8.29 %
communication with international students	10.50 %

As evident from Table 4, students decided to become part of virtual mobility due to a new challenge that virtual mobility brings, for reasons of communicating with students from other countries and because they found the topic of the course interesting. The students' pointed out that they joined the virtual mobility course in order to develop the following

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competencies: personal development, development of linguistic skills, development in the field of culture, academic development and others.

As DOBA Faculty primarily focuses on online learning, the implementation of virtual mobility brought fewer challenges than are usually faced by higher education institutions that provide only the traditional study mode. Teachers are already skilled in preparing courses for online learning and as the school already has sufficient information support for the provided online learning mode, the challenges faced by DOBA Faculty predominantly related to the students who were included in virtual mobility courses. Students have to have specific knowledge and skills in order to be able to take a course in the virtual environment. This predominantly relates to:

- Online learning, where the ability of time and information management and self-discipline are important.
- Communication skills, which include the ability to agree, disagree and summarise as well as intercultural acceptance and awareness of cultural differences and ethics.
- The knowledge of English.
- The knowledge of information technologies, especially browsing the Internet and testing different technologies (forums, blogs, chat, etc.).

Students thus have to be provided sufficient support in order to gain the knowledge and skills that are required for online learning. Experience have shown that students, who had previously been engaged only in the traditional study mode, need four times more technical support than students, who are experienced in online learning.

Managing international groups also requires detailed planning, especially as a number of students are less active, while the groups of students are also very diverse in terms of their cultural background. In virtual mobility, the task of online tutors, whose role is to monitor students' progress and help them with substantive and technical issues, is thus predominantly focused on motivating students.

Our ten years of experience with implementing virtual mobility also has shown that during the implementation of a course, individual activities are often adapted to the motivational needs of students. As some students prefer to gain knowledge by observing instead of cooperating, team activities often had to be transformed into individual activities.

Experience also shows that dropping out of courses taken in the virtual environment is rather frequent. Considering the average of all years that virtual mobility has been implemented at the school, 20% of students prematurely withdraw from taking the course.

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Opinion polling among students also shows that the majority of students who had not had any previous experience with online learning have gained faith in such type of learning. The students easily overcame the challenges brought by participating in an international environment. The majority of the students find only the initial days of the course to be difficult.

Conclusion

Despite numerous challenges that a higher education institution has to overcome when introducing virtual mobility, the advantages brought by virtual mobility are such that an increasing number of institutions are deciding on implementing it. Virtual mobility facilitates cultural connections, while keeping costs very low. Virtual mobility can offer individuals different knowledge and major personal development. It enables the exchange of linguistic and cultural experience, while most importantly also offers all these advantages to individuals who cannot afford to engage in physical mobility. The results of the survey presented in this article show that students mostly decide on virtual mobility as it represents a new challenge, while they wish for virtual mobility to improve their intercultural competencies and the knowledge of English.

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A MODEL OF THE DIGITAL MATURITY OF SCHOOLS IN CROATIA

Lucija Dejanović, Croatian Academic and Research Network (CARNet), Croatia

About CARNet and e-Schools project

CARNet is an acronym for Croatian Academic and Research Network, which is established in 1991 as a project of Croatian Ministry of Science and Technology, while in 1995 the Government of Croatia established CARNet as an institution with the purpose of facilitating progress of society through the use of new information technologies. It is a public institution that operates under the Ministry of Science, Education and Sports in the field of information and education technology and its application in education system from primary to tertiary education.

Due to its mandate to support education system in integration of technology and perceived need to raise the level of digital maturity of schools in Croatia, CARNet started pilot project *e-Schools – Development of the System of Digital Maturity of Schools* with the aim of establishing a national system for the development of digital maturity of Croatian schools. Pilot project started in 2015 will last to 2018 and it will be used to test the organisational, technological and educational conditions for introducing ICT in 150 primary and secondary schools in the Republic of Croatia (around 10 % of all schools). Within the pilot project CARNet will propose a model of Digital maturity of schools for Croatia consisting of Framework for digital maturity of schools, evaluation of digital maturity of schools and Programme of external evaluation of digital maturity of schools. The project is authorized by the Ministry of Science, Education and Sports and 85% of project is co-financed by the European Union from the European Structural and Investment Funds. The budget is 40 million EUR. Partners on this project of national significance are these educational institutions: Education and Teacher Training Agency, Agency for Vocational Education and Training and Adult Education as well as Faculty of Organization and informatics from University of Zagreb.

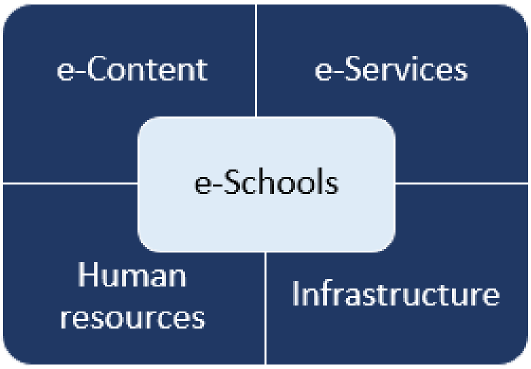

Figure 1. Components of schools development through the project

In order to raise the level of digital maturity of schools, during the project school ICT infrastructure will be built, schools will be equipped with IT equipment, resources for STEM subjects will be developed, principals, teachers and administrative staff will be trained and other processes will be put in place to ensure integration of ICT in teaching, learning and organisational processes in schools. After the pilot, it is planned to implement a major project, which will involve 700 of Croatian schools and it will build on lessons learned in the pilot in order to raise digital maturity of participating schools for one level.

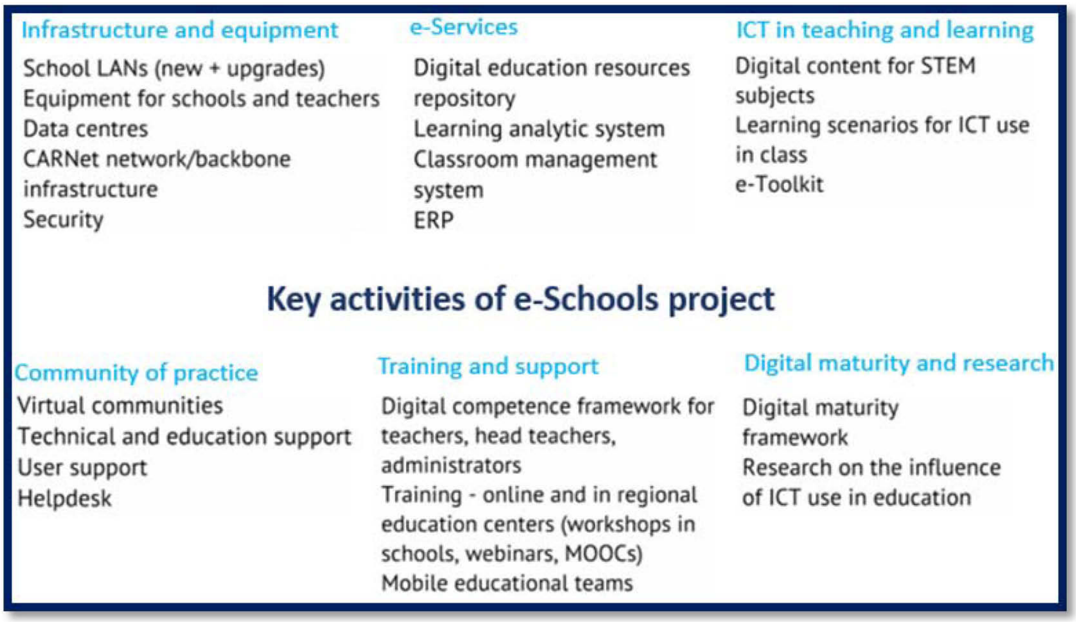

Figure 2. Key activities of e-Schools pilot project

Framework of the digital maturity of schools

The framework of the digital maturity of schools is a theoretical concept which is created by the group of experts from the Faculty of Organisation and Informatics, University of Zagreb in partnership with CARNet. It describes requirements that should be met by the schools in order to prove their digital maturity. These requirements are covered by several domains.

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Figure 3. Domains of the Framework of digital maturity of schools

Methodology of the Framework

The framework defines five levels of digital maturity, ranging from basic to e-mature level.

Table 10: Levels of digital maturity

Basic	Initial	e-Enabled	e-Confident	e-Mature

Due to the fact that there is no similar national framework in Croatia, the project consortium found it necessary to develop one in order to build schools of 21st century. The framework of the digital maturity of schools and instrument for the evaluation of digital maturity are in the final phase of development. Methodology that is used in developing framework and instrument is comprehensive and unique, based on the qualitative analysis and comparative analysis of existing frameworks made in several European countries, for example Ireland and European Union, with necessary adjustments to Croatian context.

Purpose of the Framework

The Framework for digital maturity of schools will serve as a basis for self-evaluation and external evaluation of digital maturity of schools, to help schools in the planning and implementation of ICT, but also as the basis for measuring the success of the whole project to raise the level of maturity of the digital school. In that respect, the framework is also thought as a model for mapping the scope and activities for raising digital maturity levels during the e-Schools project.

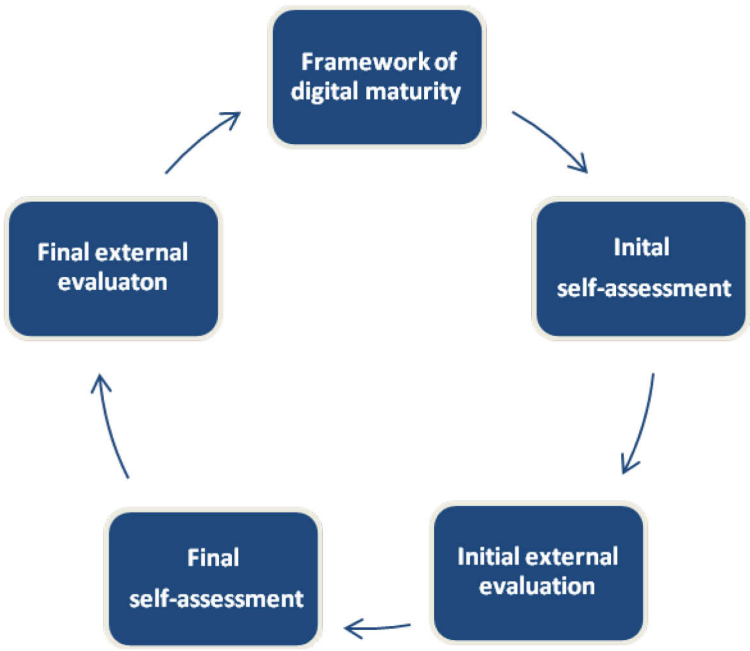

Figure 4. Implementation process of Digital maturity model elements

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Evaluation of the schools

It is planned to carry out initial and final measuring through self – assessment tool for schools and external evaluation in order to measure levels of digital maturity of the schools in the project. Initial self – assessment will give schools insight in the current level of digital maturity and final self – assessment will allow schools to compare their initial and final results, provide them feedback for reaching the next level and give them a sense of accomplishment. It will be made in a form of a questionnaire.

Purpose of the external evaluation is to objectively assess development of the schools. The process will be done by external evaluators on site through the interview with school management, teachers and students. Before visiting schools, they will study the necessary documentation to prepare themselves for determining the current level of ICT integration according to the framework for digitally mature schools. In the end, the school will receive the appropriate badge that will give the school an additional motivation and credibility but also a greater visibility of the project. It is the intention that external evaluation of e-Schools serves as basis for development of a national programme for external evaluation of digital maturity of the schools.

Difference between results of initial and final evaluation of the schools will also be an indicator of success of the pilot project.

Supporting schools in raising digital maturity level and recommendations for further usage of ICT

With the aim of raising level of digital maturity of schools, the project ensured support to principals and school teams for ICT integration. Project activities will enable schools to create a clear vision of strategic application of ICT in schools.

The schools will be supported in development of these strategic documents:

- ICT school implementation strategy;
- ICT school implementation plan;
- Document for the responsible and safe usage of ICT;
- Document on the ICT implementation for the students with special educational needs.

Another important aspect of supporting schools is a reflection of the process of managing the application of ICT in schools and exchange of experiences with other school teams, which will be achieved through organization of reflexive meetings for members of the school teams.

In addition, on the basis of experiences gained during the e-Schools project, the draft strategy of digital maturity of schools will be made on a national level.

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QUALITY PACT FOR (E)TEACHING – AN EXAMPLE FROM THE UNIVERSITY OF BONN

Cornelia Helmstedt, University of Bonn, Germany

The more universities direct their attention to the quality of teaching, the more important the teaching competence and competence development of lecturers becomes (c.f. Kerres et al., 2005; p.7).

This poster will present the newly-created eteaching qualification for lecturers of the University of Bonn, funded by the *Quality Pact for Teaching* (cf. http://www.qualitaetspakt-lehre.de/en/1294.php). This joint programme of the German Federal Government and the Länder are supporting numerous German Higher Educational Institutions (HEIs) to improve study conditions and the quality of teaching in higher education, among them the University of Bonn. One goals of the Pact is to provide support in the qualification or further training of staff and to ensure and further develop the quality of education.

Due to this Pact, the University of Bonn has – amongst other activities – established the Centre for University Teaching (BZH) and extended its eCampus elearning services in the first funding period from 2012 to 2016. Both centres then cooperated in designing and delivering an eteaching qualification for lecturers.

The BZH together with the eCampus team have developed a formal eteaching qualification, culminating in an eteaching Certificate. Analogous to an already existing qualification in place in the field of university didactics, the eteaching certificate has been organised in three modules – basic, extension and advanced with a total workload of 100 working units à 45 minutes.

All modules can also be booked individually and are creditable for the certification scheme in university didactics as well.

The first workshop *eteaching introduction* was held in November 2015 with 15 participants. 7 other workshops will follow until the end of the summer semester 2016.

The newly-created eteaching qualification of the University of Bonn addresses the training needs of lecturers of the University of Bonn in order to integrate elearning in their teaching practice. First results and lessons learnt will be presented.

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CITIUS, ALTIUS, FORTIUS, RETICULIUS: OPENING UP VOLUNTEER TRAINING FOR THE OLYMPIC GAMES TO THE NETWORKED AGE

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Abstract

This paper examines the experiences of an eLearning profession at the Vancouver 2010 Olympic Games. It looks at the Games-time training team's work in introducing eLearning to the training of over 19,000 volunteers as a case study (Merriam, 1998). As the first Olympics Games that opened up volunteer training to eLearning, Vancouver 2010 shows that online, networked (reticulius) learning can be leveraged and scaled up, despite numerous institutional and resource constraints.

That which is ostensibly *free* still accrues costs. For example: without the support of thousands of *free* volunteers, the delivery of a large scale, multisport event like an Olympic (and Paralympic) Games is no longer feasible; in fact, for each paid staff member there are as many as 10 or more volunteers. Despite significant savings in terms of remuneration, a large, properly acquitted volunteer workforce still has significant needs that necessitate spending substantial amounts of money.

Granted, volunteers generally do not receive wages for their work. Nonetheless, there are substantive expenditures associated with this *free labour*. Volunteers need uniforms: for a winter Olympics this necessitates expensive clothing to meet specific technical and safety requirements for working in the cold. As well, during volunteer shifts food and beverages are routinely supplied. Finally, transportation for volunteers – most often via public transport or event-provisioned *fleet* vehicles – is required, since every Olympic Games comes with restrictions on private vehicle use around official Olympic venues. Thus, the logistical issues involved with ensuring the basic needs of an Olympics Games' large team of volunteers are met are substantial. The resources required are proportional to the size of the volunteer workforce at a particular Games. Table 1 summarises the sizes of the volunteer workforce at each of the five most recently delivered Olympic Games:

Table 1: Olympic volunteer workforce (source: International Olympic Committee)

Olympic Games	Type	Volunteers
2006 Torino	Winter	18,000
2008 Beijing	Summer	100,000
2010 Vancouver	Winter	19,000
2012 London	Summer	70,000
2014 Sochi	Winter	25,000

These data show all Olympic Games have large volunteer workforces to manage. There are many more sport disciplines, medal events, and competitors for a Summer Olympics, along with thousands of additional officials and spectators, and many more competition venues. While there has been a cap on the number of medal events and total number of athletes at each Summer Olympics for almost two decades, new events continue to be added to the Winter Olympic schedule. In fact, between the Torino (2006), Vancouver (2010) and Sochi (2014) Winter Olympics, the number of medal events increased by approximately 25 per cent: more events still will be added for the Pyeonchang Winter Olympics in 2018. The addition of new medal events requires an even larger volunteer head count.

Aside from such material needs, it is the training of volunteers that is perhaps most resource-intensive element of developing a large volunteer workforce. Aside from being fed, clothed and transported, volunteers need to be confident in their ability to perform their role in the specific context of that role. Equally important, their willingness to engage in advance training is predicated on their good will – good will that can evaporate quickly if there is a perceived gap between the time required to complete training, and the preparation required to fulfil the role, and the benefit of the training itself. Training for Olympic volunteers therefore needs to ensure this balance is met equally for both the expert (with a unique skill set) and generalist (whose required skills are more interpersonal than competency-based) volunteers.

This paper, a reflection on practice in the form of a case study (Merriam, 1998), examines key innovations from the Vancouver 2010 Games-time training, which subsequently transformed the Olympic volunteer experience, particularly with respect to training delivered online. It describes how the affordances of available technologies significantly drove (and constrained) online training opportunities for a Vancouver 2010's 19,000 volunteer workforce. While the focus – discursively and descriptively – is on the Olympic Games, the processes described here are mirrored for the Paralympic Games. A Paralympic Games, though smaller in scope, have a proportionally smaller workforce.

The motto of the Olympic movement has been *Citius, Altius, Fortius* for over a century: Olympic athletes endeavour to be faster, higher and stronger. In developing the volunteer training for Vancouver 2010, we added eLearning – *reticulius*, or networked learning – to the volunteer experience.

Positionality and Methodology

My contribution to the Vancouver Games had two elements. In 2007 I left a full time academic role to take up a paid role at the Vancouver Organizing Committee for the Olympic and Paralympic Winter Games (Vanoc). I was the first of ten Games-time *training specialists* appointed to the human resources *functional area* (FAs), which was called Workforce. As training specialists we were primarily tasked with supporting training requirements for both paid and volunteer workforce members who would deliver the Games. Staff and volunteer training related to work done during the pre-Games period was (mostly) handled separately.

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My period of employment at Vancouver 2010 included several key initiatives:

- Training for an all volunteer call centre, which began operations two years before the Games
- Supporting training for two *sport event* test events: alpine skiing and short track speed skating
- Writing the service component of the Games-time training curriculum (Service Excellence), as well as key components of the broader curriculum
- Designing and delivering *train the trainer* sessions for volunteer trainers who would deliver much of the Games-time training sessions
- Delivering general orientation and service excellence training sessions to Games-time volunteers
- Producing, writing, and providing voiceovers for Games-time e-learning modules

Despite a number of rewarding experiences, the pull of academia remained strong throughout my tenure as a Vanoc employee, and I returned to the university a year later. However, upon resigning my paid role I was offered numerous Games-time volunteer management roles. Of these I chose to be a team leader for Workforce's (staff and volunteer) uniform distribution centre – a role that included co-developing the training of fellow volunteers in the uniform team.

During my three year tenure at Vanoc I kept a reflective blog about my experiences, which served as a primary data source for this case study. Having signed a non-disclosure agreement in force until 31 December 2011, this was not forward-facing on the world-wide web. Materials, including the training collateral produced and my own field notes from my paid and volunteer work for Vanoc, were an additional data source.

Literature review

There is a narrow, emergent literature about the Olympic volunteer experience, where individual Games-time volunteers' narratives are often prominent. Zhuang and Girginov (2012) interviewed Beijing 2008 volunteers, whose training experience some respondents described as something one "might think was rigorous, but [was] full of flaws." (p.248). Kodama, Doherty and Popovic (2013) presented results from an autoethnographic study of the lead author's experience as a former elite athlete who became a Games-time volunteer in Vancouver.

Benson et al. (2014) used the lead author's experience as a Games-time volunteer to analyse the training delivered for Vancouver 2010. They acknowledged that "this was the first time that a significant e-learning experience had been made available for Olympic and Paralympic volunteer training" (p.216.), though they were critical of several elements of the training offered. Ross Brown et al. (2013) conducted a follow-up survey of clinical staff who worked in a mobile medical unit for Vancouver 2010. However, their study's focus was on job-specific and venue-specific training that was clinical in nature – and delivered by the local health board rather than through Vanoc. The training, did, however, include eLearning modules, which were delivered via the health board's intranet.

Wilks (2014) looked at the lived experience of London 2012 Olympic and Paralympic Games volunteers, though training was only cursorily mentioned. Minnaert (2014) examined how London 2012 purposefully embedded diversity and inclusivity in both paid staff and volunteer recruitment and training, in order to create "an opportunity for sharing good practice and encouraging different approaches to employment and skills" (p. 207). Finally, Brown et al (2013) looked at the experiences of three veteran Olympic workforce volunteer members at London 2012; however, their training experiences were only cursorily considered. None of these articles looked at the organising committee experience of developing and delivering Olympic training.

On Your Mark

The Vancouver 2010 Olympic Games sought to be innovative with respect to the digital realm. Vanoc were the first organising committee that required all volunteer recruitment and scheduling to be done online. All communication was digital; a volunteer portal (On Your Mark) aggregated the spectrum of the volunteer experience, from submitting an application to volunteer, through recruitment, offering roles, managing training and scheduling volunteer shifts during the Games themselves. Mindful that many potentially valuable volunteer candidates might be less *tech savvy*, a large volunteer call centre was set up, where applicants could get assistance and support. Volunteers provided assistance in both official languages of Canada (English and French) as well as via TTY for deaf or hard of hearing applicants.

An early commitment was made to the International Olympic Committee that all volunteers would attend face-to-face sessions for the compulsory components of the Vancouver 2010 workforce training. Drawing up previous organising committees' work, the Vancouver 2010 Games-time training curriculum had five components:

1. *General Orientation*, an overview of the Olympic movement, the Winter Games, and the Vancouver Games;
2. *Service Excellence*, focussed on the service standards for the workforce;
3. *Job-Specific Training*, including skills and knowledge required for specific roles and FAs;
4. *Venue-Specific Training*, where operational aspects of each competition and non-competition venue, included emergency procedures, were addressed; and
5. *Event Leadership*, for volunteers who would be supervising other volunteers.

In practice, these were not necessarily delivered as distinct units or sessions: FAs were able to combine these five elements, when appropriate. While there was a fifteen month window to

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deliver all these face-to-face sessions (between October 2008 and January 2010), a large volunteer workforce – drawn from across Canada, a massive country, as well as internationally – has diffuse and complex training needs: even this extended timeframe proved operationally challenging for some FAs and their volunteers.

Vanoc had almost 50 functional areas (FAs), which included fifteen sport disciplines. Each FA had its own leadership, requirements, and timetables. Each also endeavoured to manage these in ways that suited their own requirements, rather than the logistical constraints of Vanoc, writ large. In some instances, *games-time* volunteer roles commenced as early as October 2009, when volunteer accreditation and uniform distribution began. Harmonizing these complex and, at times competing, interests was challenging for the Games-time training team.

Yet, as the nature of volunteer roles varies, so can availability to the volunteers for training. For local volunteers, training at either Vancouver or Whistler (the two host cities, where most of the competition and non-competition venues were located) several months before the Games began in February 2010 was usually tenable. But for an elite cachet of returning volunteers, including competition officials selected by the various sport disciplines, this was not the case. Vancouver would not have been their first Olympic volunteer experience; most, would also be arriving perhaps one or two days before their first shift, severely limiting the scope for extensive face-to-face training on-site.

Sport event training

Prior to delivering the Olympics, Vanoc (like all Olympic organising committees) was required to successfully deliver a sport event, which is an international-level (world cup, world championships or similar) competition for each sport discipline. For the Vancouver Olympics, the fifteen sport disciplines were:

- Alpine skiing,
- Biathlon,
- Bobsleigh,
- Cross Country Skiing,
- Curling,
- Figure Skating,
- Freestyle Skiing,
- Ice Hockey,
- Luge,
- Nordic Combined,
- Short Track Speedskating,
- Skeleton,
- Ski Jumping,
- Snowboarding,

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- Speed Skating.

Within each discipline were between two and twelve medal events. Sport events, previously (and subsequently) known as test events, ensured the relevant competition space (field of play) is games-ready. Aside from demonstrating readiness to host the Olympics, these were the main opportunity for athletes to familiarise themselves with the field of play, an important element of their preparations. For existing venues, sport events were usually held earlier: thus, the alpine skiing sport event was held in February 2008: two years before the Games. Newly constructed (or significantly renovated) venues held their test events much later: the speed skating oval was only completed in December 2008 and held its test event in March 2009, less than a year before the Games.

Sport event volunteer training programmes were an integral element of preparation for Games-time volunteer training. FAs tried to recruit volunteers willing to work both a sport event and at games time, since this created a more experienced Games-time volunteer workforce. Whilst the same themes were found in the curricula of both Games-time and sport event training, the sport event curriculum model was compressed into two (rather than five) components:

- Event orientation, including general orientation, venue orientation and service excellence; and
- Job-specific training, which also included elements of venue orientation and event leadership.

For sport-specific FAs (e.g. speed skating, biathlon, or figure skating), managing their involvement with their sole sport event was relatively straightforward. However, FAs that provided services across multiple sport events (e.g. as ticketing, anti-doping, logistics and event services) found themselves supporting multiple, sometimes overlapping sport events. For many, this meant concurrent sport event and games-time volunteer training activities for several months.

The commitment to face-to-face mandatory training was genuine. Regardless, we in the Games-time training team knew that purposeful and effectively deployed eLearning could make an important contribution to the Games-time volunteer training enterprise – and address some of the logistical challenges faced by different FAs.

A quasi-blended model

Ultimately eLearning was leveraged in preparing the Games-time volunteer workforce for the 2010 Olympics, after overcoming significant barriers to doing so. The extent to which (as well as what sorts of) volunteer training could be delivered online proved to be a pivotal question, in light of the earlier commitment to face-to-face training. Several of us in the Games-time training team had been hired because of our strong background in e-learning, as had been our manager. There were also advocates for a genuinely blended approach to volunteer training

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among Vanoc leadership. But prior to 2007-2008, there had been no online volunteer training at an Olympics. As a fundamentally conservative entity, the International Olympic Committee was not ready to sign off on a training model that was genuinely blended, i.e. where mandatory training content was covered face-to-face or online.

Further, if Vanoc were to have developed mandatory eLearning training content, we would have needed a learning management system (LMS) to track participation, completing and assessment. There was no budget for an LMS licence or hosted solution. The IT functional area (FA) had a Moodle installation, but were not resourced to offer it for other FAs to use. Their virtualised server was provisioned to support a few hundred concurrent users from their own FA, not tens of thousands of concurrent users from across Vanoc. Similarly, Vanoc leveraged MS Sharepoint extensively, but for the paid staff intranet only: the workload involved with provisioning user accounts for Games-time volunteers would have greatly exceeded the server loads. Without an LMS (or similar platform), Games-time training could not reliably track volunteers' online training activity; without another FA running and supporting an LMS we could not access a reliable LMS environment. This significantly constrained our eLearning options.

Thus, although the initial principle remained unchanged: mandatory, *need to know* elements of volunteer training had to be covered in a face-to-face training session. This still left considerable scope to develop materials that were either elective – *nice to know* – or that reiterated and reinforced mandatory content covered in mandatory face-to-face training. In particular, content about the history of the Olympic and Paralympic movements, the various sport discipline, or important functional areas that provided support to all workforce members (e.g. transportation, event services, commercial rights management) or commonly used technologies operated (e.g. radio protocols, accreditation) could leverage eLearning.

And yet…whilst there was significant capacity for developing eLearning training collateral within our team, we were not a large enough team to wholly produce these materials ourselves: the eLearning component of Games-time training was a relatively small portion of our workload. Our team was tasked with managing overall Games-time training collateral production, including for eLearning. Subsequently we developed an eLearning module workflow that was manageable, efficient and effective.

Importantly, we needed to rely on subject matter experts (SMEs) from each Vanoc FA to write eLearning content. With few exceptions, there was no existing capacity for developing eLearning collateral. To leverage their expertise, we needed to develop a workflow that allowed them to produce a *raw* core of materials that we could massage into professional, high standard eLearning content, without the process being onerous. That meant limiting the introduction of any new tools for SMEs, since most would only contribute to a single eLearning module. Concomitantly, we needed to ensure that the material developed could easily be ported into our production environment.

We reviewed a number of software options for our eLearning module production environment. Our technical requirements included:

- Polished, sophisticated output;
- Ability to sequence storyboard content, including revisions sequences;
- Consistent, but flexible look and feel;
- Integration of formative assessment;
- Ease of use for the Games-time training team;
- Ease of importing SME developed content.

We selected Articulate Presenter for our production environment. In addition to meeting all our technical requirements, Articulate Presenter's use of PowerPoint to generate learning modules greatly facilitated content development by SMEs. Since most of our SMEs were experienced PowerPoint users, we could give then a module template in PowerPoint, along with just-in-time training and support materials to get them writing content. Once they returned material to us, we could easily massage it a module prototype. We also asked them to include some questions for formative assessment about their content.

The Articulate quiz tool allowed us to embedded formative assessment objects (called "knowledge checks") within modules, including both corrective and confirmatory feedback for learner responses. Once finalised (including embedding multimedia content, including W3C accessibility requirements, such as voiceovers), a translated module was created in either French or English (depending on which language the SME worked initially), since all modules were to be made available in both languages. SMEs were then given a link to their module for any final adjustments, after which modules were loaded into the On Your Mark volunteer portal for volunteers to study.

Just in Time – Online

Despite the extensive, fifteen month training window, and broadening the training footprint via eLearning, there remained issues with ensuring all volunteers received adequate training. For those elite volunteers whose late arrival in Vancouver made attending extensive face-to-face training impossible, a concession was ultimately made with respect to the face-to-face requirement for mandatory training. A limited number of these volunteers were offered a just in time, digitised version of General Orientation and Service Excellence training. A self-playing, interactive CD-ROM (also created using Articulate Presenter) delivered an eLearning module covering the same mandatory content from the face-to-face sessions. These volunteers were mailed a CD copy for viewing; their FA was responsible for ensuring their volunteers consumed the content. Eventually the CD version was re-published for online delivery and added to the *On Your Mark* portal, so all volunteers could use them as review materials.

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Conclusion

Many of the practices from Vancouver 2010 served as effective pilots for a much wider use of reticulius: networked, online learning as part of Olympic volunteer training; Vancouver was at the vanguard of the Olympic and Paralympic Games volunteer training experience becoming a networked one, vià vis eLearning. Within two years, the London 2012 Organising committee implemented a broader Games-time training strategy, including mandatory eLearning content. This included an *actual* hospitality qualification all London 2012 volunteers were able to receive (Wilks, 2014; p.8), including summative assessments conducted wholly online: the lessons learned from the Vancouver Games meant London 2012 could put in place the sort of digital ecosystem that would support a comprehensive, trackable, assessment capable online training.

Benson et al. (2012) cited "four mistakes" with respect to the training delivered for Vancouver 2010, which were partially accurate. Indeed "no records of who accessed online info" (p.216) were collated, which is explained above. However, rather than "no prior knowledge assessment" having been integrated into training, these were purposefully integrated into the face-to-face training sessions: these were, in fact, scripted for the trainers. Further, the knowledge checks in the eLearning content were not recorded towards a "credentialing or certification process" because none of the relevant credentialing bodies (such as Tourism BC) were amenable to this being embedded in the *free* volunteer training: WorldHost and other similar credentials are revenue generator for those organisations. Finally, rather than "limited evaluation of the training experience" (p.216), each session was evaluated qualitatively and quantitatively, and results aggregated and analysed fortnightly.

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PROFESSIONAL SKILLS IN MANAGEMENT AND LEADERSHIP, ENTREPRENEURSHIP AND COMMUNICATION – THE E-PROFMAN PROJECT

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Introduction

The 2007 to 2015 European Communication Monitor reports that "linking communication and business strategy" has been identified as the most enduring challenge for communication professionals within the next years and how to build and maintain trust for the business of the organisation in a digital era where active audiences have their own social media, demand transparency and produce enormous volumes of information at high-speed (Zerfass et al., 2015; Verčič et al., 2014). Interviewed professionals said that the most important factors for career development are further education and networking among peers and colleagues. Furthermore, the European Commission's Opening up Education initiative (European Commission, 2013) stimulates developing new business and educational models of curriculum development.

The Joint Online Programme for Professional Development in Innovative Management, Leadership and Strategic Communication – Macedonia, Slovenia and Turkey project will establish a virtual campus of three higher education institutions from Macedonia, Slovenia and Turkey that will develop and implement a joint online programme for professional development in innovative management, leadership and strategic communication. The fully online programme will promote progressive pedagogical approaches, virtual mobility, intercultural cooperation and internationally recognised competencies.

One of the main objectives of the project is equipping programme participants with appropriate skills and abilities in achieving competitive advantage and effective leadership behaviour in a transnational corporate environment. The participants will acquire a high level of competencies recognised in the partner countries within the Bologna credit transfer system. The programme will further enhance their job prospects in the (trans)national labour market. The poster will present the main findings of the research (phase 1 of the project) which was carried out among working individuals (employers and employees).

Professional skills

Skills have a major impact on each individual's life chances as well as enterprises and countries in today's globally connected and complex world, as analysed by the OECD (2013) survey of adult skills (PIAAC). The survey focuses on the skills of literacy, numeracy and problem solving. As individuals age and spend more time out of education, other factors become increasingly important for enhancing and maintaining these skills. These are participation in adult learning activities, the tasks they perform at work and engagement in activities involving the use of literacy, numeracy and problem-solving skills outside of work. OECD (2012) also prepared the OECD Skills Strategy, an integrated, cross-government strategic framework to help countries understand more about how to invest in skills to transform lives and drive economies. One of the activities is the development of skills through education, which should result from labour market needs. This is also the focus of our study and the project e-Profman.

Management and leadership skills

Robert L. Katz (1955, 1974) first argued the importance of identifying management skills for successful performance in managerial roles. He proposed a three-category typology of skills: technical, human and conceptual. These are general categories, but within each category, more narrowly focused abilities could be identified. Management authors (Peterson & van Fleet, 2004; Bigelow, 1991) believe that only a set of managerial skills, coupled with technical skills, enable managers to manage effectively. Davis et al. (1996) emphasise that a successful manager and an effective leader should have certain skills: be able to communicate clear, resolve conflicts, analyse problems, coach and develop subordinates, and make decisions. In their study, Burke and Collins (2001) analysed the following management skills: delegating, conflict management, coaching and developing, personal organisation and time management, communicating, personal adaptability, problem analysis and decision-making, and their association between leadership styles.

In our study, we are interested in the importance of certain management and leadership skills to fill the vacancies in companies/organisations: organisational skills, problem-solving skills, ability to make strategic decisions, strategic planning and creative thinking.

Entrepreneurial skills

Markman (2007) identifies entrepreneurial skills as technical (as in science and technology-led businesses), human skills (to handle relationships inside and outside the venture, to lead and motivate others), conceptual skills (to recognise and evaluate opportunities, process trends in an industry or market), and networking skills. Chell (2013) states that the dominant theory in entrepreneurship identifies the key skill as alertness to opportunity. Chang and Rieple (2013) identify relevant entrepreneurial skills as: management skills, environmental scanning skills, creativity skills, technical skills, and personal maturity skills.

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Entrepreneurial skills, which are the focus of our study of identifying how important they are to fill the vacancies in companies/organisations, are: creating and analysing business opportunities, entrepreneurial innovation, ability to network, ability to identify strengths and weaknesses, and the ability to focus on customers.

Communication skills

Within the field of public relations, practitioners have been noted to assume a variety of roles, which are necessary specific competencies, knowledge and skills. Dozier (1992) distinguishes between the managerial and technician role of communicators: "Managers make policy decisions and are held accountable for public relations program outcomes," whereas "technicians carry out the low-level mechanics of generating communication products that implement policy decisions made by others" (p.333). He argued that communication managers enact elements of the expert prescriber, communication facilitator, and problem-solving process facilitator roles whereas the communication technician role could be conceptualised as separate and focuses on the technical aspects of public relations work. The top communicator playing a strong managerial role and participating in strategic planning and programming for the organisation, and having close partnerships with the dominant coalition of the organisation (Grunig 2008; Dozier et al., 1995; Grunig et al., 1992). Skills and competencies required for most occupations today differ from those required in the twentieth century due largely to the emergence of complex information and communication technologies. Arising from this dual role of communicators, the following main communication skills are required: social and intercultural skills, information literacy, analytical, critical thinking and problem solving skills, strategic communication planning, digital/social media use, and intercultural communications.

In our study, we are interested in the importance of certain communication skills to fill the vacancies in companies/organisations: strategic communication planning, digital/social media use, intercultural communication, marketing communication, issues management, and risk and crisis communication.

e-PROFMAN – The online quantitative survey

The survey was carried out from 15 January to 15 February 2016 in six countries: Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Macedonia, and Turkey. Answers from 1,305 respondents were received (survey completed by 692 respondents and 623 partially completed). The poster presents only the findings of the Slovenian survey (26% of valid units). The survey results will help determine the specific needs of organisations in the private, NGO and public sector for knowledge and skills of their employees for effective market presence in the markets from Central Europe to Turkey. They will also help us develop and create the curriculum for the online lifelong learning professional development programme in the field of management, leadership and strategic communication.

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Respondents considered that the most frequent obstacles in (and need for) effectiveness of human resources in organisations are problem solving skills, communication skills, creative thinking skills, and leadership skills.

Table 1: The most frequent obstacles in (and need for) effectiveness of human resources in organisations

Most frequent obstacles	Percentage
Problem solving skills	13.2%
Communication skills	13.2%
Creative thinking skills	12.8%
Leadership skills	12.4%
Critical thinking skills	10.1%
Strategic planning skills	7.4%
Managerial skills	7.1%
Ethical issues	6.0%
Social and intercultural skills	5.1%
Research skills	4.8%
Analytical skills in global and local economy	4.4%
Digital/social media use skills	3.1%
Other (please, specify)	0.4%

The respondents were then asked about their personal need for professional development. The most common needs are to build communication skills, the ability to use knowledge (hand on know-how), and problem solving and leadership skills. The remaining skills are fairly evenly distributed; respondents expressed digital/social media use skills as the least needed skills to be obtained, as shown in Table 2.

Table 2: The most frequent personal needs for (and obstacles in) professional development

Most frequent personal needs	Percentage
Communication skills	11.3%
Practicality – the ability to use knowledge	10.7%
Problem solving skills	8.9%
Leadership skills	8.6%
Strategic planning skills	8.0%
Critical thinking skills	8.0%
Research skills	7.9%
Creative thinking skills	7.9%
Social and intercultural skills	7.5%
Analytical skills in global and local economy	7.3%
Managerial skills	7.3%
Digital/social media use skills	6.1%
Other (please, specify)	0.4%

Respondents believe that the most relevant skills of innovative management to the job vacancy are business management economics/global economy (value of 5.5 on a 7-point Likert scale), creative or critical thinking (5.3) and digital/social media use (4.7). The most relevant skills of leadership are problem solving, communications skills and strategic and systematic thinking (5.3 for all three skills), and collaboration and networking (5.0). The most relevant

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professional knowledge/skills of strategic communication according to respondents from Slovenia are communications skills (5.5), intercultural communication, strategic and systematic thinking (5.3).

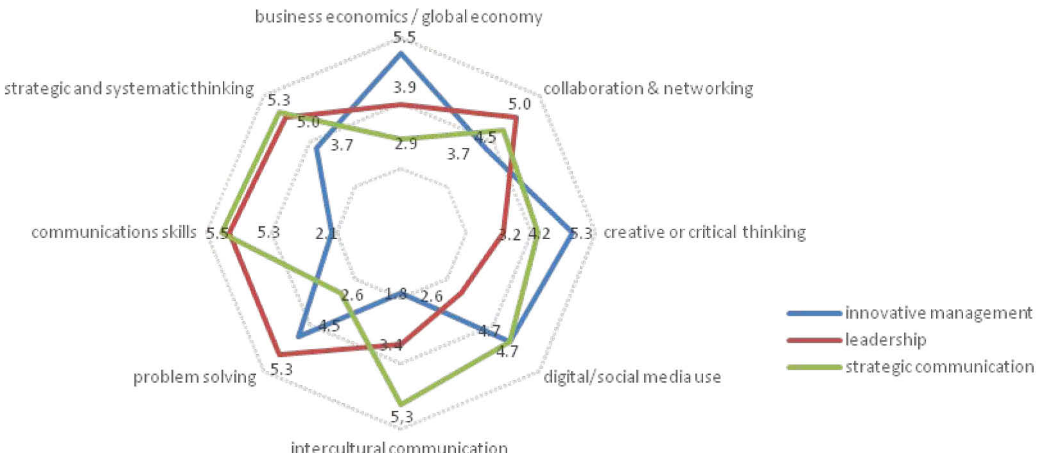

Figure 1. The most relevant professional knowledge/skills of innovative management, leadership and strategic communication to the job vacancy

Conclusion

Skill is a method or technique for producing desired results and all of the knowledge and methods for being consistently effective (Greene & Burleson, 2008). There is a lack of strong consensus amongst researchers about the definitions of terms such as *competency*, *skill*, and *knowledge* in management, entrepreneurship and strategic communications. The most prominent discrepancy is the discussion surrounding what, if any, the difference is between a skill and a competency, but in modern economy, one that demands flexibility from its workers, the difference between what is meant by *skill* and *competency* is shrinking. Once thought of as the technical knowledge required of a particular job or occupation, skills are considered more dynamic and include a wide array of general and personal capacities and attitudes. For example, the largest national professional communication association in the world, the Public Relations Society of America (2006), defines knowledge as “what practitioners need to *know* in order to undertake their role competently” and skills as “what practitioners need to *be able* to do to undertake their role competently”. We believe that with the continuation of the research project, we will succeed in explaining the knowledge, competencies and skills in the research areas and that we will develop an effective professional training programme.

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