

# **Output O2**

## **SP4CE pedagogical concept**

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## Short executive summary

This document covers overview of the achievements, results and lessons learnt from the already implemented projects, and the detailed description of the innovative theoretical and pedagogical concept of the SP4CE portal.

It is organised in 3 chapters for better navigation through the document and the explored concepts:

- Chapter 1: Results and lessons learned from already implemented projects
- Chapter 2: Collaborative learning for creativity and innovation
- Chapter 3: Online mentoring and coaching

## 1. Results and lessons learned from already implemented projects

The results from the following projects served as a base for the further work on SP4CE project:

1. OpenInn2.0: A Knowledge Generating House and e-Assessment Model
2. The Innovation Laboratories for the Quality Assurance of Vocational education and training (iLab2)
3. The High Growth Coach
4. TeleCAD project
5. SIGOLD project
6. INNOVATRIN TRANSFER project

## 1.1 OpenInn2.0: A Knowledge Generating House and e-Assessment Model

### Aim of the project

The OpenInn project aimed to:

- bridge the implementation gap in the use of ICT in a creative way to support learning and social coherence linking together different sectors;
- support the evolvement of a stable positive self-esteem both for learners and for facilitators in the learning environment. By reassuring the self-esteem through autonomous learning, it also generates inner motivation for learning;
- increase opportunities for exploiting intellectual capital of young talents and groups at-risk;
- produce a comprehensive e-Assessment Model containing the theoretical concept and didactics for creativity, with topics including: ways to support the learner to introduce new ideas, evaluating and rewarding creative results, methods for giving instructions to reach innovative solutions, providing autonomy for creative expression both for not-yet ICT users and advanced level users in their specific sectors;
- create the “Knowledge Generating House” as an innovative social network for exploring creative potentials.

### Short description

OpenInn project provides a new pedagogical and organisational model to communities and individuals through the use of an online ideation tool. This model enhances learning in formal and informal education, and supports innovative assessment. The project is geared towards students, teachers and managers, and builds on a person’s own interests to strengthen their creativity and self-confidence.

OpenInn offers a new perspective linking education with the corporate world of “open innovation”. The project has produced quality textual and multimedia resources in 9 languages that support the independent learner/trainer and enhance open innovation, assessment and creativity. There is a clear coherence between the textual resources addressing the pedagogical model and the technological tool „Knowledge Generating House” (KGH) for open innovation in education. The approach is to be integrated into the partners' own educational interventions.

Users could use the KGH platform looking for ideas expressed by others and by exploiting their own inner potentials as well. This generates a new learning

experience, where not only young talents, but groups at-risk of falling out of educational system can be actively engaged in creating and inventing. By collaborating with others, they can attain new perspectives for understanding a case and developing it, and by the new perspectives they are able to understand themselves better. This reassures their self-esteem and makes the base for exploring their inner potentials.

The project aimed at implementing the Open Innovation concept in the educational sector to develop a new learning paradigm which exploits the potentials of ICT for learners above 15 years. There is an importance of leaving the model open for more sectors of the educational field because the field of use can still be a process of evolution depending on the end users. This concept was targeted at the primary target group which consists of talented youth in higher and secondary education. The secondary target group are persons at risk of falling out from the educational system in secondary, higher education, vocational training and adults who wish to further explore their capabilities. The tertiary target group are teachers and facilitators of talented youth and groups at-risk in secondary, higher education, vocational training or adult education institutions. The OpenInn project results could be used in the long-term perspective for the students with a specific research or scientific interest, experts, SMEs, managers of large enterprises, non-profit organisations and groups that need more support in order to be able to use the portal for enhancing creativity.

### **Results of the project**

OpenInn has developed a web 2.0 prototype tool (Knowledge Generating House) and a pedagogical guide (the e-Assessment model) to involve schools in real-life innovation processes for lifelong learning.

As was mentioned above, main outcomes of OpenInn project are presented in OpenInn portal (see Figure 1.1.1) and includes “The Guide to Creativity (an e-Assessment Model)” which is a complex electronic educational material serving as a "guide" for teachers using KGH, respectively for teachers interested in innovation trends in education and in innovative didactics for enhancing creativity. The Knowledge Generating House represents on-line ideation tool. The Demo video and video guide to OpenInn portal and Knowledge Generating House serves as promotional tools, but also as help for perspective users together with “OpenInn Guidebook “ user manual for the Knowledge Generating House with explanations of all features developed and “OpenInn project website” with all information about the project, partnership, activities done, etc.

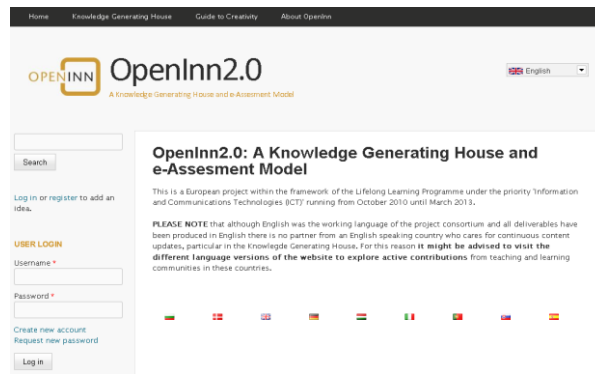


Figure 1.1.1 Introduction page of OpenInn portal

The portal is multilingual – all information is available in nine languages: Bulgarian, Danish, English, German, Hungarian, Italian, Portuguese, Slovak and Spanish.

The “Guide to Creativity” presents on-line material for teachers and also for managers interested in innovation trends in education and in innovative didactics for enhancing creativity. The material is divided into modules containing ways how to support the learner to introduce new ideas, ways how to evaluate and reward creative results, methods for giving instructions to reach innovative solutions, providing autonomy for creative expression both for teachers who are not-yet computer users and to those who are advanced internet users. Every module consists of the self-learning material “Pedagogical background” that provides the reader with a comprehensive theoretical background about the Open Innovation principle and its possible usage in the field of addressing and assessing creativity in an educational context. The ICT Tools section provides a list of ICT tools, their descriptions and ways how they can be used in an educational context. Every item contains three sections based on the level of a potential user’s digital literacy: without the necessity to use ICT tools; using basic level ICT tools; using innovative and advanced level of ICT tools. The Practical examples section presents a collection of particular scenarios describing how to apply ICT for teaching and learning to increase creativity. The 25 scenarios were developed for different educational contexts as well as for the different digital literacy of the users. Rather than a consecutive order the scenarios are presented as single independent items, assigned to two different categories: kind of educational sector (secondary school student, vocational student, university student, and adult learner), level of ICT skills (non-ICT user or beginner, basic ICT skills, advances ICT skills). The Resource library contains more interesting teaching and learning material about enhancing creativity not used in the previous sections.

The Knowledge Generating House (see Figure 1.1.2) supports the development of new ideas and online brainstorming. KGH also offers commenting and voting the ideas. These activities are divided into place for collaborative learning ('Innovation e-Learning Rooms' for brainstorming and mind-mapping), space for uploading documents (like academic studies, thesis, portfolios) and individual 'creativity assessment' (based on the level of activity, provided ideas etc.).

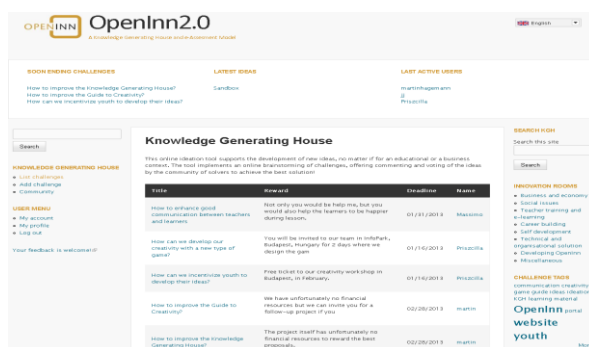


Figure 1.1.2 Knowledge Generating House home page

## Assessment / feedback from users

OpenInn pilot testing was concerned on testing the functionality and quality of every part of the OpenInn portal. In connection with target groups and main objectives of the project, the partnership decided to provide tests with three pilot-group tests with the portal - 2 pilot-groups with 10-30 students/learners including one teacher/facilitator and one pilot-group only for teachers with 5-20 persons. Besides 25 national pilots done in Danish, German, Italian, Portugal, Slovak, Spanish language, there was realized one international pilot involving 4 partner-countries (Denmark, Hungary, Germany and Bulgaria) in English, so that students were able to use the portal with peers online from other countries. Together on the pilots participated 357 persons involving different education level institutions, based on project's target groups: secondary schools, vocational schools, universities and adult education institutions and with different ICT skills level - no ICT, basic ICT and advanced ICT. During the pilot testing users created 113 different challenges included to various Innovation rooms (Business and economy, Social issues, Teacher training and e-learning, Career building, Self-development, Technical and organizational solution, Developing OpenInn, Miscellaneous), added 165 new ideas to these challenges and 155 comments.



## Lessons learned

291 users took part in the final feedback, what represents 82% of all pilot test participants. The achieved results could be briefly generalized as follows:

- About 80% users agreed or strongly agreed, that developed the OpenInn portal is easy to use and navigate, has a clear layout and format, has easy-readable content and has sufficient response time. Concerning OpenInn portal structure and functionality, the pilot tests participants appreciated sharing ideas with others and possibility to get opinion from other users as also the overall layout, with the different areas visible in the top and menu to the left, placement of different articles.
- Almost 75% of users agreed or strongly agreed, that KGH part is also easy to navigate, easy to add new challenges, ideas, votes or comments, easy to find existing challenges, ideas or comments. The majority of respondents marked as best feature of the KGH for the supporting creativity itself, the possibility to read ideas from others and sharing of the contributions and the simple way to add challenges, ideas, comments and votes and possibility of get response from several different countries.
- The last specialized part of OpenInn portal - Guide to Creativity – and its subparts were evaluated only by teachers, what means 28% of all respondents' feedback. The majority of them agreed or strongly agreed that all developed parts are clearly and easily to understand, well and logical structured and suitable to support creativity in teaching and learning (Figures 1.1.3-1.1.5).

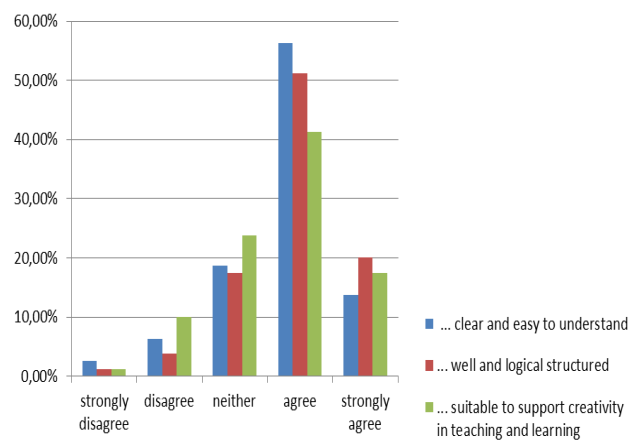


Figure 1.1.3 Evaluation of the GtC: PEDAGOGICAL BACKGROUND

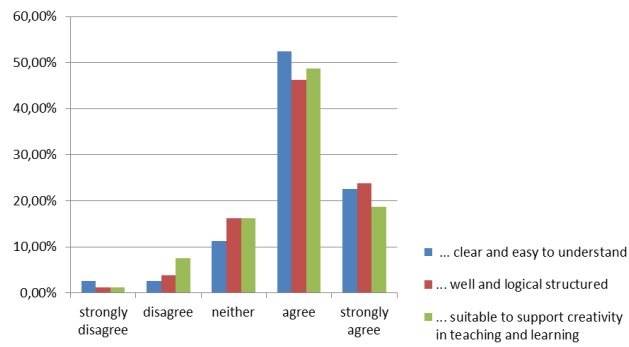


Figure 1.1.4 Evaluation of the GtC: PRACTICAL EXAMPLES

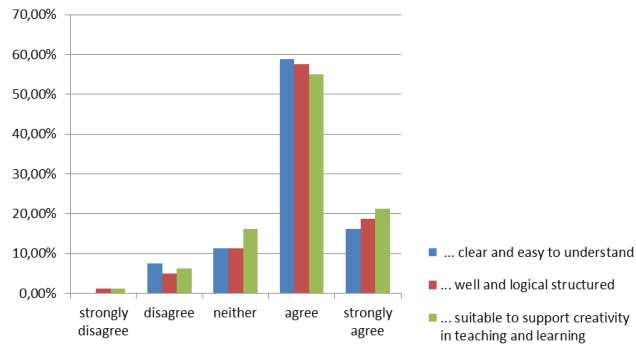


Figure 1.1.5 Evaluation of the GtC: ICT TOOLS

## 1.2 i-LAB2 – Innovation Laboratories for the quality assurance of vocational education and training

### **Aim of the project**

The Innovation Laboratories for the Quality Assurance of Vocational education and training (iLab2) constitutes of a two-year project (2012-2014) implemented under the Leonardo da Vinci: Transfer of Innovation Programme.

Its main objective is the improvement of the vocational education and training quality through the Innovation Laboratory application in didactical processes. As a result of the project, the target group of beneficiaries: teachers, trainers and managers of VET institutions shall acquire new competences within the scope of application of the ICT technology in the educational process. An indirect beneficiary group, students of vocational education, shall develop its creativity, innovativeness, skill of problem solving, team work, efficient use of ICT tools through participation in classes during which the i-Lab shall be applied.

### **Short description**

An i-Lab (Innovation Laboratory) is an inspirational innovative facility designed to transport users from their everyday environment into an extraordinary space encouraging creative thinking and problem solving. It is based on a model created by Royal Mail's Future and Innovation Group in Rugby, UK (1997). Its initial purpose was to provide simulated environments as a way of including new and potentially disturbing factors in organisational planning and to help management teams brainstorm future possibilities. Therefore, the idea of an i-Lab has evolved to become a special place in which groups and teams can explore and extend their thinking beyond the normal boundaries of assumptions and constraints.

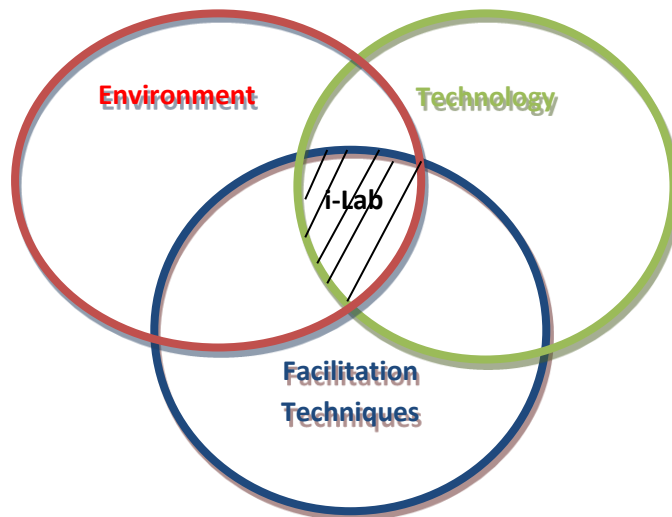


Figure 1.2.1 The three factors that form the concept of i-lab

### Results of the project

The outcome of the project implementation shall include mainly:

- New innovation laboratories in Poland, Germany, Romania and Slovenia
- Virtual Brainstorm (VBS) software
- Guide to Good Practice with descriptions of new experience
- Innovative methods of education and improvement

### Assessment / feedback from users

Below is a selection of comments giving a “snapshot” of client feedback, following their time in the i-Lab environment:

“The result of the i-Lab session exceeded my wildest dreams! What would have taken a month of meetings was achieved in one very enjoyable day”.

“It was a super environment which promoted brainstorming and sharing of ideas with colleagues on a particular focused project. Using the computers was great to quickly gather the views of the group. The i-Lab gives great possibilities on generating ideas and people’s opinions.”

“We were delighted about the extent to which the i-Lab environment generated our creative juices and helped us come together.”

“The i-Lab is an inspiring and fun place to be. It’s almost a child-like experience where you forego any preconceptions about what you’re supposed to do and start from scratch”.

## **Lessons learned**

The group work method applied in the innovation laboratories, aiming at improvement of group decisions, is based on the brainstorming method that has been known for many years. Appropriately constructed software is an element constituting an advantage of the solutions applied in i-lab. After the presentation of the issue, participants enter their ideas, further comments and proposal assessments on the screen. Ideas, any doubts concerning proposals and voting results are displayed on the projection screen in the room. Main advantages include anonymity, honesty and speed, as it excludes chats, limits digressions and allows everybody to speak simultaneously. A half-day session in the i-Lab has been proven to be more ideas driven and results led than a normal weekly departmental meeting.

The features which characterize the i-Lab are privacy, multiple media for working and a distinctive design layout that creates a vibrant, inspiring and creative environment. Writable walls, toys and other tools used, impressed the participants with the atmosphere which brought them back to their childhood.

i-Labs constitute flexible spaces and are applied by various types of organisations and institutions. Enterprises (from small companies to large international corporations), public organisations, training and educational institutions (including universities), as well as charities successfully use the potential and convenience offered by the i-Labs.

The innovation laboratories constitute support for any team work, including among others planning (e.g. action scenarios), management (e.g. of changes, conflicts, projects), development (e.g. of strategies, products, services), mind mapping, organisation of consultation or focus groups, trainings and many others.

In addition, i-Lab is useful at integration of heterogeneous groups, for example at work of institution of international projects, social consultations and sessions with participation of business support organisation members. [11]

### 1.3 The High Growth Coach project

#### Aim of the project

The overall goal of the project was to adapt and deliver a UK development programme for coaches working with high growth companies to enable the development of effective and competent specialist high growth coaches for use by regional and national agencies engaged in high growth coaching in Romania, Lithuania, Slovenia and Hungary.

The main project objectives were:

- To increase stakeholder and Partner understanding of the competences and VET practices required for the effective support of High Growth enterprises
- To develop a High Growth Coaching Competency Framework and Coach Competency Assessment Tool enabling the identification of competency gaps in potential and actual High Growth Coaches
- To develop 75 potential and actual High Growth Coaches
- To set up a European network of High Growth Coaches to promote the exchange of best practice

#### Short description

The High Growth Coach project was piloted by 18 coaches in each of the five partner countries (UK, Romania, Lithuania, Slovenia and Hungary). The Lisbon European Council (Mar 2000) set a strategic goal for Europe to become the most competitive and dynamic knowledge-based economy in the world stressing the critical role of education and training as the main instruments for the development of human capital, economic growth, productivity and employment. UK national and European VET/economic policies place an increasing emphasis on fast growing enterprises for economic growth. In the UK, it has been recognised that High Growth SMEs require support from coaches who understand the needs of high growth companies and how to deliver High Growth coaching. In 2007 The East Midlands Development Agency appointed Exponential Training & Assessment (ETA) to develop and deliver the Growth Enabler Programme to address a market failure in the development of high growth coaches. This project adapted and exploited this programme and developed a streamlined, less resource intensive High Growth Coach development programme for delivery in the partner countries.

High Growth Coach project included 3 main modules:

- Coaching Processes
- Coaching Roles
- Fundamental Skills of Coaches

### *Coaching Processes*

There are several types of coaching nowadays, in the HGC project the model of a “Business Coaching” was used as the coaching process. The chart below shows the coaching circle of a business coaching. One coaching process / coaching circle is shown in this chart as a process: starting at stage 1, ending at stage 5. Stage 5 is the closure of the coach circle, and may serve – as a possibility – as a basis for a new coaching circle. The tasks executed in each stage is placed in the boxes under the main box.

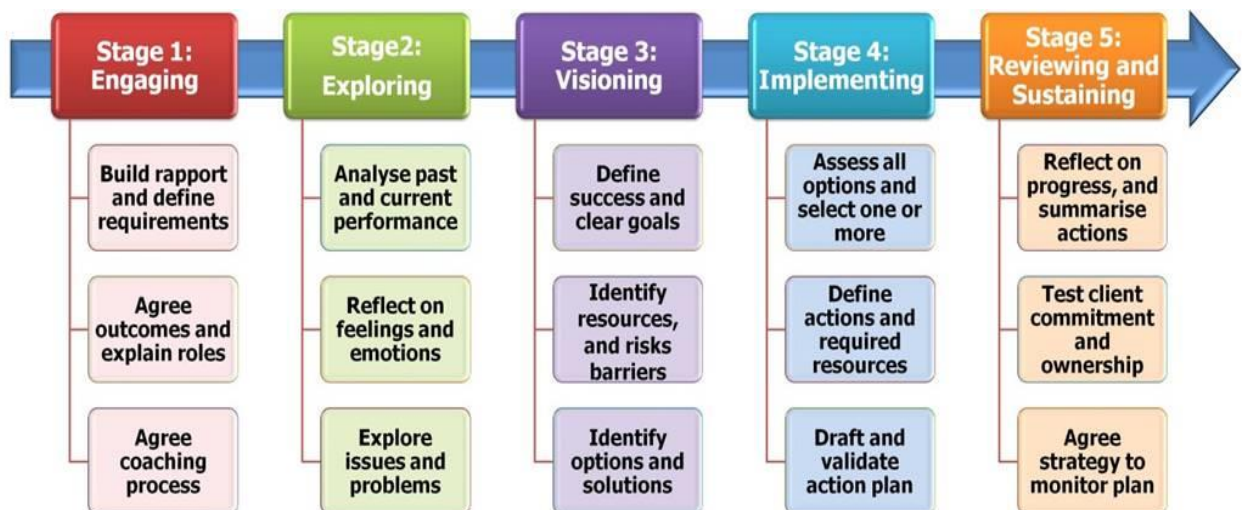


Figure 1.3.1 The tasks executed in each stage of project

### *Coaching Roles*

The High Growth Coach project has determined the following seven roles to the coaches:

- Coach
- Trainer
- Facilitator
- Advisor
- Broker

- Consultant
- Mentor

The “classical” coach role is supplemented with the other 6 roles in the HGC project. The HGC training material provides a detailed training for all these roles.

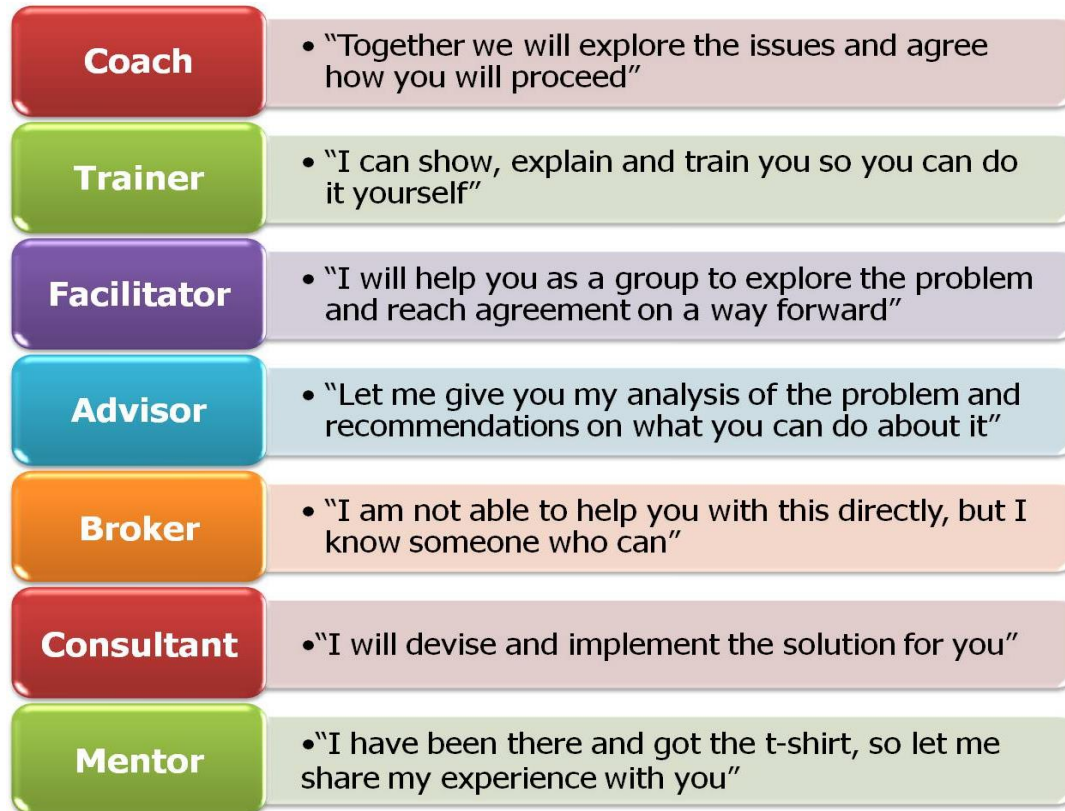


Figure 1.3.2 The roles in HGC project

### *Fundamental Skills of Coaches*

This part is the most valuable part for SP4CE project, under these headings a detailed training material is developed for the coaches trained under the High Grow Coach project. The skills that a coach shall have to fulfil his/her role are:

- **Building Rapport:** Build rapport with the client, including pacing and matching client language and non-verbal behaviour
- **Client Dialogue:** Engage in transactional and transformational dialogue with clients and the different levels of coaching dialogue
- **Questioning Strategies:** Use questioning strategies including open questions, the TED Model and know what questioning strategies not to use
- **Active Listening:** Listen actively, using techniques such as summarising, reflecting and clarifying



- **Challenging:** Challenge and develop clients' levels of self-awareness and understanding of issues and strategies
- **Critical Thinking:** Encourage clients to think critically about issues and scenarios
- **Reflection:** Support clients with their reflection skills and techniques
- **Review and Recognition:** Help clients to recognize and review their progress and development
- **Feedback:** Provide effective feedback to clients using a range of feedback tools and techniques
- **Goal Setting:** Help clients to set well-structured goals, defining their vision of success and which are congruent with their values, needs and vision
- **Action Planning:** Help clients prepare clear, goal oriented SMART action plans to meet agreed objectives and deadlines and support clients with strategies to address barriers, with accessing resources and with planning for contingencies
- **Coaching Resources:** Use a variety of coaching resources to manage their relationship with and provide coaching to clients
- **Knowledge Transfer:** Ensure clients possess the know-how to take action

### **Results of the project**

The main results of the project were:

- A high growth coach competency framework and assessment tool
- A 16 week high growth coach development programme
- 75 trained high growth coaches

The main impact of the project was to increase partner and the involved VET agency capability and capacity to deliver high growth coaching to SMEs. The main results included: Improved understanding of the training needs of High Growth Coaches; Increased understanding of High Growth Coaching practices, tools and techniques; improved quality of High Growth Coaching practices; improved confidence in working with High Growth Companies; Availability of and access to a compendium of High Growth Coaching tools.

### **Assessment / feedback from users**

#### *Self-assessment tool*

In form of a workshop the programme of HiG was delivered to 18 actual or potential High Growth Coaches in each of the partner countries. These coaches undertook a

self-assessment based on the High Growth Competency framework before and after the programme. This self-assessment tool was designed to assess the coach in various fields at the entry phase-before the workshop and at an outcome phase-having completed the workshop. The assessment was based on a High Growth Coach Reflection & Development Journal developed by the consortium. During the 16 week programme the trainee coaches had to follow a study plan that they set up for themselves following guidelines from the project facilitators. The following main topics were in focus: The Coaches' Professional Network Map, Unique Selling Point, Vision and Goals, Coaching Agreement Terms of Business, Coaching Plan, Their selected High Growth Coach Toolbox, High Growth Coaching Case Study Template.

In the meantime coaches had to reflect upon their activities and their personal skills and competences development. They had to evaluate themselves every 4 weeks during the training. The journal gave an insight into the development of the coach from the following aspects: building rapport/client dialogue/questioning strategies/active listening/ challenging/ critical thinking/ reflection/ review and recognition/ feedback/ goal setting/ action planning/ coaching resources/ knowledge transfer.

#### *Assessment of the project*

Evaluation of the project and its outcomes was set around various aspects. Main project phases as well as project meetings were evaluated by the project partners alongside evaluation criteria set up jointly by the partner responsible for the evaluation and the project coordinator. These evaluations reflected a nice working atmosphere of the project and main satisfaction with project outcomes. More challenging aspects were translations due to their big volume and the involvement of the target collective as with workshops and other activities trainers had to deal with a quite heterogeneous group ranging from already experienced coaches to trainees of coaches. However, the overall evaluation of the project its outcomes and the training were all assessed very positively and achieved good ranking from the Commission too.

#### **Lessons learned**

Communication is the core of any activity done in groups. To have a well-operating communication system, it has to be constructed in a way that all participants accept it and that it serves the targeted goal in a most supportive way. The role of the coach

therefore is very important, (s)he is the key person to success. Her/his fundamental skills are a very determining part in the whole process, these skills can be more developed by the training material of HGC, or the training material may serve as an aid in crucial points.

Three interesting and informative charts are shown here to give an insight on the training material. These three charts provide attitudes in the following tasks of a coach: listening, questioning and feedback.

Main qualities of effective listeners:<sup>1</sup>



Figure 1.3.3 Main qualities of effective listeners

How questions create value? :<sup>2</sup>

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<sup>1</sup> High Growth Coach Fundamental Skills Part 1, Training Material

<sup>2</sup> High Growth Coach Fundamental Skills Part 1, Training Material



Figure 1.3.4 Creation value through questions

Feedback Do's<sup>3</sup>



Figure 1.3.5 Feedback Do's<sup>4</sup>

<sup>3</sup> High Growth Coach Fundamental Skills Part 1, Training Material

<sup>4</sup> High Growth Coach Fundamental Skills Part 1, Training Material

## 1.4 TeleCAD project

The idea of the TeleCAD course has been evolved from the AutoCAD course delivered in ODL (Open Distance Learning) mode for Civil Engineering students at Gdansk University of Technology since 1996. The TeleCAD project (Teleworkers Training for CAD Systems' Users) was co-financed by European Union Leonardo da Vinci Programme and developed by Gdansk University of Technology (GUT) in co-operation with four foreign institutions from Greece (IDEC, ZEUS), Finland (Pekkala Software Oy), Italy (ARGO) and one Polish company Young Digital Poland S.A. [21].

### Aims of the project

- Developing an Internet based platform (Learning Management System) for the distance courses preparation and delivery.
- Developing training materials available in 3 formats: printed, CD, online.
- Enabling distance and group work for students, tutors and managers.

### Short description (methodology)

The AutoCAD course at Gdansk University of Technology has been delivered for many years in a traditional mode – as lectures and activities in a computer laboratory. In order to reduce number of face to face meetings an idea to convert the course to the distance mode was born. For this purpose several students took part in an experimental course in a distance mode. They had been given printed course materials and were supposed to contact the teacher using e-mail or phone. Consultations and the final assignment submission were done by e-mail. All students finished the course with Autodesk certificates.

After the first trial there was an extensive study of experimental results. Finally it was decided that the course should consist of 10 modules. Each module contains a set of drawing tasks with appropriate solution. The course materials were prepared as HTML pages that could be access online or from the CD ROM [22].

The course incorporates also a module about basics of teleworking. The methodology of teleworking is presented and communication tools are integrated in the TeleCAD LMS. Students are supposed to prepare a project in groups. The final assignment of the course is a project which must be delivered by internal e-mail in the TeleCAD system to the tutor. To prove that the student actually was an author of

the drawing, he/she may be asked to make some changes to the project in the presence of the tutor.

### **Results of the project**

- Since the end of Leonardo da Vinci project the TeleCAD course was offered as an environment for teaching AutoCAD and telework for students and others.
- The learning materials were published by Polish Publishing Company MIKOM (Warsaw) in October 2002 [22] in a book and CD forms.
- The learning materials are also available online as Open Educational Resources (OER) [23].
- The TeleCAD course and platform were offered within other EU project as EMDEL (Leonardo da Vinci), Meeting of Generations (Grundtvig) and CURE (6 Framework) [29].
- The TeleCAD methodology was included in the offer of the Autodesk Authorised Training Centre at Gdansk University of Technology (ATC at GUT) [24].
- The Learning Management System (LMS) TeleCAD was an inspiration for implementing distance education and blended learning at the Gdansk University of Technology.
- In 2003 due to lack of resources for technical development and improvements of the TeleCAD software the TeleCAD was replaced with Moodle [25].
- In the Table 1 there is a list of TeleCAD LMS usage in the period 2000-2002 [21].

<b>TeleCAD implementation</b>	<b>Number of users</b>
Pilot international (2000/2001)	89
Pilot PL (2000/2001)	35
Students' exam (sem. 2, 2000/2001)	240
Students' exam (sem. 2, 2000/2001)	166
Extra mural students' exam (sem. 4, 2000/2001)	62
Extra mural students' exam (sem. 3, 2001/2002)	24
Extra mural students' exam (sem. 4, 2001/2002)	40
Students' exam (sem. 2, 2001/2002)	259
Summer course 2002	4

*Table 1.4.1 TeleCAD LMS usage in the period 2000-2002*

## Assessment / feedback from users

In the TeleCAD LMS an internal evaluation system was used. The questionnaires were build and modified according to the manager and user's needs. The internal system was used for evaluating the training materials, collecting learners needs and the pilot courses evaluation [21].

After including the course into the offer of Autodesk Training Centre at Gdansk University of Technology the evaluation system proposed by Autodesk has been used [24], [25].

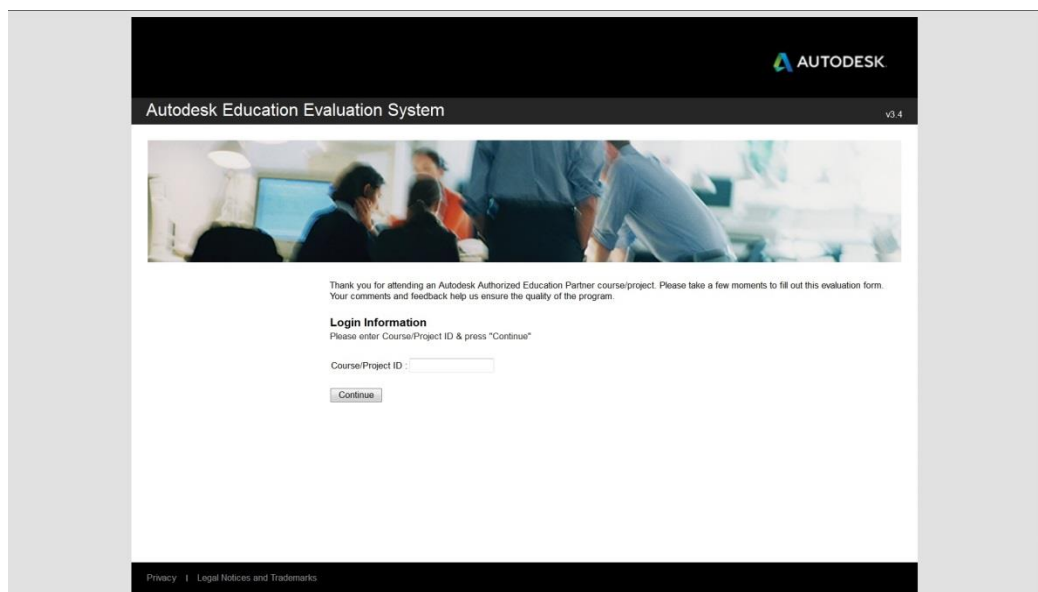
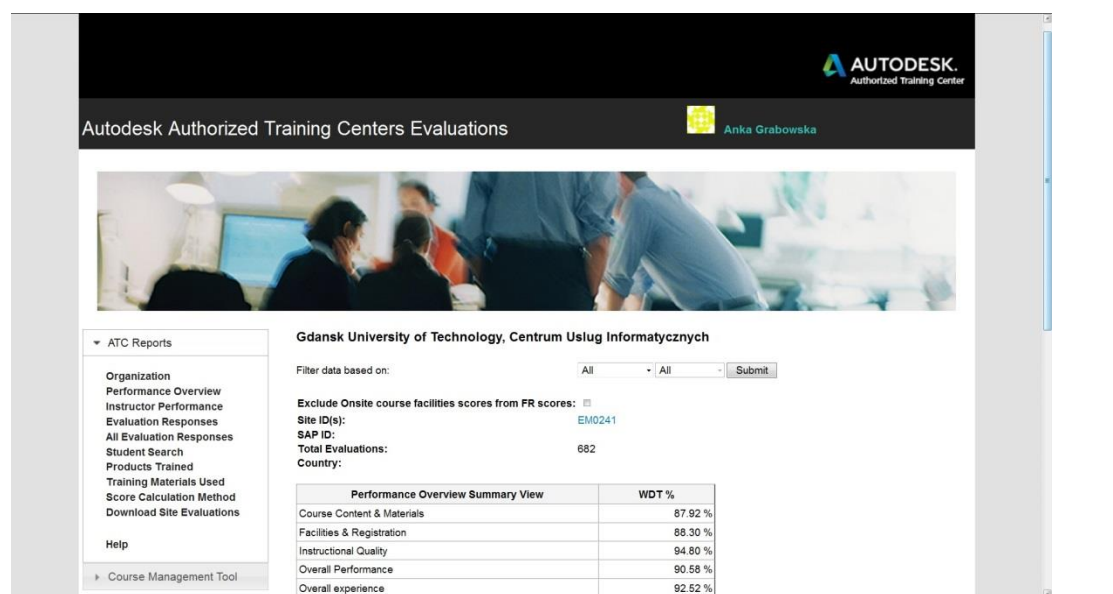


Fig. 1.4.1 Welcome screen of the Autodesk evaluation system



*Fig.1.4.2 An example evaluation of the performance of ATC at GUT*

### **Lessons learned**

- While planning the project the most important issue is taking into account the real needs of potential users.
- It is recommended to implement the project deliverables on the commercial or non-profit way in order to support the project sustainability.
- Due to financial constraints regarding the software development and improvement it is recommended to use Open Resource solutions which are on a top of interest of professional communities.
- For sustainability purpose it is recommended to offer a certificate that is internationally recognized and to promote it effectively [27], [28], [29].



## 1.5 SIGOLD project

The SIGOLD project has brought together three key players' groups – 50+ workers, their employers (HRD managers), and educators (teachers and trainers) in order to contribute by their shares and prepare the win-win situation for all of them. The main idea of the project SIGOLD was to support the creation of age integrated society, help 50+ workers to get a chance for active ageing as active participants in an age-integrated society and ageing well at work, at home and in their communities.

### **Aim of the project described**

The main objective of the project:

- to improve the position of 50+ workers in the labour market and society and to increase knowledge, skills, competence and understanding of the direct target groups 50+ workers, HRD managers, educators, and trainers through newly developed e-learning courses, awareness raising and dissemination activities.

The main project objective was decomposed into the following partial aims:

- to analyze the present situation in the field of lifelong learning, workability and employability of 50+ workers
- to develop three blended courses for the identified target groups
- to test the newly developed courses in pilot runs and adjust them according to the obtained feedback
- to ensure the effective and efficient project management, implementation and project products exploitation
- to disseminate project products, information on project, its activities and progress

### **Short description (methodology)**

Within the project the situation of 50+ workers has been investigated, HRD policy implemented for this age group in companies, and education and training methods suitable for target groups used. Based on the data from 5 project partner countries (Slovakia, Cyprus, UK, Austria, and Greece) and their analysis the report State of the arts and needs analysis which served as the main input for the development of blended courses for 50+ workers, HRD managers and educators has been elaborated. The developed courses were tested – the pilot runs of all 3 courses in 5 project countries in four languages – English, Slovak, German, and Greek were carried out. During and after the pilot runs the feedback from both participants and

trainers has been gathered and analysed. The adjustment of the tested courses according to the obtained data has been carried out. Such approach reinforced the contribution of Lifelong Learning to social cohesion, gender equality and personal fulfilment of 50+ workers, contributed to participation in lifelong learning by people of all ages, and supported the development of innovative ICT- based course content. Project activities have also contributed to creation of favourable environment for 50+ workers through the dissemination and awareness raising activities focused at the indirect target groups: public administrators, labour offices, trade unions, social services providers. The final international conference organized in April 2013 hosted almost 100 participants from 10 countries.

### **Results of the project**

- The questionnaire focused on course content, course delivery and organization, and communication in the course.
- Report State of the arts and needs analysis in the field of lifelong learning, workability and employability of 50+ workers
- English prototypes of the blended modular courses and their national versions in German, Greek, and Slovak languages, which were tested/piloted and then based on the obtained feedback adjusted to the final form
  - o Course for 50+ workers: Active Ageing, Ageing well
  - o Course for educators & trainers: How to educate and train 50+ workers
  - o Course for HRD managers: How to turn silver to gold
- English guide How to study in Moodle in the Sigold courses
- International conference & conference proceedings

### **Assessment / feedback from users**

There were 2 different tools used for the assessment and feedback gathering:

- Pilot Training: Participants' Feedback Questionnaire: This part covered the questions focused on the course content, course delivery, and communication and support during the course.
- Pilot Training: Feedback Questionnaire for Trainers: This part covered the questions focused on the course content and quality of study materials, course delivery with the main focus on the ratio between F2F and independent study and Moodle use, and group dynamics.

Feedback questionnaires were used by all partners to collect information from the pilot course participants and trainers. All gathered information was processed and

published in the Report from the pilot runs. In general, the feedback was very positive in all participating countries and only very little adjustment was requested.

Testimonials example:

- “These courses were really challenging. The instructors were extremely helpful and the way we worked it was something new to me. Not only the on-line course but also the face-to-face ones were very well organized and helped me understand how to keep a positive attitude towards ageing.”
- Sometimes people should stop and think about life events regarding to the ageing. We did it and it was very interesting and motivating
- During the training I received encouragement; I think it would be great for others too...
- “The way these seminars were structured helped me understand the needs of 50+ workers. The discussions we had during the seminars were very exciting and I enjoyed them.”
- “The seminars helped me understand what 50+ workers need in the market and the society. My interaction with the instructors was fantastic.”

### **Lessons learned**

Based on the feedback from both trainers and participants but also from the participants of the final project conference we can conclude that it is crucial to look at the problem – challenge from the perspective of all key players (50+ people, their trainers and teachers, and employers represented by the HR managers) which can directly influence the situation at the lower level and then influence it and push to the decision makers acting at the higher levels (e.g. politicians).

## 1.6 INNOVATRIN TRANSFER project

### Aim of the project

Transfer of INNOVATRIN Project has been realized over the years 2012-2014 under the Leonardo da Vinci: Transfer of Innovation Programme. INNOVATRIN TRANSFER project was aimed to help SMEs increase and keep high level of their innovativeness and competitiveness by providing means for company staff for improvement of understanding of importance and relevance of innovation process and its control. Project approach was to offer advanced training for reasonable price which cover SMEs needs in all innovation aspects area including different aspects, for example such as innovative advanced technological solutions.

### Short description

Project idea was to realize the ambitious goal of transfer and adaptation of existing results from a successful national (Spanish) project, partnership containing institutions from different countries.

Among many theoretical and practical elaborations of different innovation aspects and innovation management approaches two courses based on the two successful projects, INNOVATRIN and AIM - Acceleration of Innovative Ideas to Market, were selected to be integrated and transferred in the new e-learning course intended to fill the gap between the current innovation management practice and the state-of-the-art achievements in this domain.

Thus the main objective of the INNOVATRIN TRANSFER project was to create e-learning based courses dealing with approaches and solutions for an advanced innovation process management and introduction of the innovation standards in SMEs, targeting increasing SME's innovation potential. Training include content related to the acquisition of new ideas and knowledge to improve the enterprise, the development of its products, stimulating industrial innovation, customer interaction, shared use of knowledge and innovation process management methods.

Elaborated project methodology contains information needed for organization and delivering effective training including guidelines for content creation, putting into ICT system, proposed structure of lessons/training and guidelines for course execution.

## Results of the project

Major results achieved during the project are directly connected with the identified project objectives. Training curriculum includes content related to the acquisition of new ideas and knowledge to support the innovation process in enterprises, to stimulating industrial innovation, and to innovation process management methods. The course developed in the project is divided into two training modules and provides trainees with global and systematized approach to the important innovation related concepts and helps professionals in implementation of an Innovation Management System within their own organizations, covering all process from the concept phase to the analysis of the impact, and guidelines for organisations in introducing, developing and maintaining a framework for systematic innovation management practices. The content of the Module 1 “Innovation and Innovation Management in general” is based mainly on the results of the project AIM from which the approach for development of a system to support the collection of innovative ideas and relevant knowledge throughout the extended enterprise for fostering industrial innovations. The AIM content was enriched with some general basics about innovation and innovation management. It is intended to provide the most important general topics about the innovation and to support both newcomers and professionals in implementing an advanced Innovation Management approach and supporting ICT System in their organisations, covering the whole process from the process inception to the analysis of the impact. Module 2 “Introduction of the Innovation Management Standard” is extension of the course INNOVATRIN dealing with introduction of the Spanish standard UNE 166000:2006 – Research, Development and Innovation (R&D&i) Management. The INNOVATRIN methodology was enriched through elaboration of new learning bilingual scenarios including classical training, blended training, and distant training. New implemented ICT features include web 2.0 possibilities for increasing effectivity of learning through contact between pupils, teachers and consultants.

Project results comprise:

- Full set of lessons of the courses on General Innovation and introduction of the Innovation Standard, exemplified on the Spanish standard UNE 166000:2006 Research, Development and Innovation (R&D&i) Management. Lessons are structured into two modules according to the thematic groups,
- Training methodology consists of guidelines for INNOVATRIN TRANSFER system establishment, utilization, administration and further evaluation. It includes methods for adaptation and creation of course content as well as organisation and execution of the course prepared for trainers and consultants creating and

carrying out the course, useful also for others interested for organisation of course,

- Adapted ICT platform based on the worldwide accepted moodle LMS, which enables user friendly navigation through the logically structured content and includes parts, animations and videos illustrating specific phases along the innovation process.
- A set of templates for data gathering and analysis containing survey and structured interview, prepared during the initial stage of the project. It is available in English and all partner languages.

### **Assessment / feedback from users**

Project assessment was done by:

- internal assessment done by project partners. This assessment was based on one of project results "Project Set of templates for users requirements gathering nad analysis",
- external evaluation done by experts from all partner countries,
- evaluation done by Polish National Agency of Leonardo da Vinci Programme.

In general the INNOVATRAN TRANSFER system was assessed as good. From the performed assessment it can be concluded that apart minor difficulties in course navigation, connected with e.g. not working buttons, overall system functionality was clear, intuitive and easy in utilization. The respondents in general gave also positive feedback to the course content. They provided also some recommendations which will be taken into consideration during the commercial version preparation. The addressed issues included rethinking the titles of the lessons/courses to make them more interesting for students, improvement of the evaluation process, adding the real case studies/examples of the existing companies, and providing more external links to additional materials connected with course contents.

### **Lessons learned**

During realization of project and contact with end-users mainly from enterprises, INNOVATRAN TRANSFER project partners gained new knowledge about innovation, especially how innovation is recognized by companies, real innovation level and real training needs in this area. That information shall help to organize new related to innovation trainings.

## 2. Collaborative learning for creativity and innovation

### 2.1 Using ICT for teaching and learning

#### **Aim of the module**

This module is focused on the short description of meaning of ICT in modern education processes and presents some tools enhancing the creativity of students.

#### **Learning outcomes of the module**

The reader will read and learn about the role and impact of ICT on changes of the education processes in way to be more interesting for the young generation; about the tools that can help enhance the creativity and critical thinking of students.

#### **Introduction**

The new generation of learners is usually assigned as digital natives, NetGen or Google Generation [4]. They are growing up surrounded by technology and it is typical for them to exploit ICT in different living situation, not excluding learning, in natural way. In case of young people, as more motivating learning is identified learning through experimentation and exploration, which uses:

- elements of play,
- exploring alternative approaches by thinking and looking about thing differently,
- imaginative thinking to achieve an objective,
- making connections with previous
- and new learning and thinking critically about ideas, actions and outcomes.

All of above present most of core indicators of creative thinking. And all of these activities could be supported by ICT [1].

#### **Role of ICT in education process**

Based on the [4] could be stated that due to pressure from the EU the majority of European educational institutions are equipped with traditional ICT (PCs, interactive whiteboards and Internet connection). Continuously increasing number of them also invests to other equipment like laptops, electronic microscopes, web-cams, etc.

Various European schools use Moodle, wikis, blogs and also have their own homepage. Online platforms could provide parents access to learning materials and tasks, which would help them to understand new learning approaches and support their children at home with their schoolwork.

However, the main shortage of informatization of education process lies on teacher ICT capability. A good number of them use ICT just as an extension or replacement of traditional tools (interactive whiteboard as replacement for blackboard, PPT presentations as replacement for printed books) and Internet is used mostly for accessing new information for the teacher during his preparation for lessons.

ICT capability involves the appropriate selection, use and evaluation of ICT. It presents the ability to access appropriately, to use, develop, create and communicate information, to solve problems, develop ideas, create models and control devices, etc. using technological tools. [3] ICT helps to develop an idea to particular outcome (for example a sequence of notes with a beat, a graph, spreadsheet model or web page, a graphic image treatment, video sequence or short animated sequence of action) that can be viewed, listened to and reflected upon in order to move forward creatively in short time. Learning via ICT is very playful and engaging this way [1]. ICT permits autonomous learning model that promotes initiation, creativity and critical thinking with independent research, because learners are expected to collect, select, analyse, organize, extend, transform and present knowledge using ICT in authentic and active learning paradigm. [9]

As crucial factor for capability using the appropriate ICT tool seems to be teaching students to use ICT before applying it to specific subject and problem solution.

ICT tools like interactive whiteboards, video projection units, and microscopes connected to computers, spreadsheets prepared to capture and model data, CD-ROMs, presentations with video could be use as just supportive technological tool but also tools for enhancing students' motivation, involvement and creativity within education process. It depends on way how it is used by teacher. Unfortunately, there is no general guidance on how to actually develop creativity in practice [4].

ICT and social computing tools can influence learning by:

- supporting different senses with multimedia visualisations and representations, both in materials developed by teachers and by providing new opportunities for creativity for the students;
- supporting collaboration with new online production, commenting and networking tools, improving both overall and individual performance;



- supporting differentiation and diversity by supplying teachers with a wide variety of didactical and methodological tools that can be fitted to the respective learning objectives;
- empowering learners to personalise their learning process in a supportive environment of mutual assistance, reflection and critique and in interaction with their teachers and peers, combining formal, non-formal and informal learning activities. [10]

The influence of rapid changes in the field of ICT is also projected to the education. With inviting the smart technologies to out-school live, they are more commonly used also for education purposes. Students and teachers can interact (learn, discover, collaborate, create and share) in a safe, fun, engaging and supportive environment. Figure 2.1.1 presents a wide range of ideas how to use ICT in education.

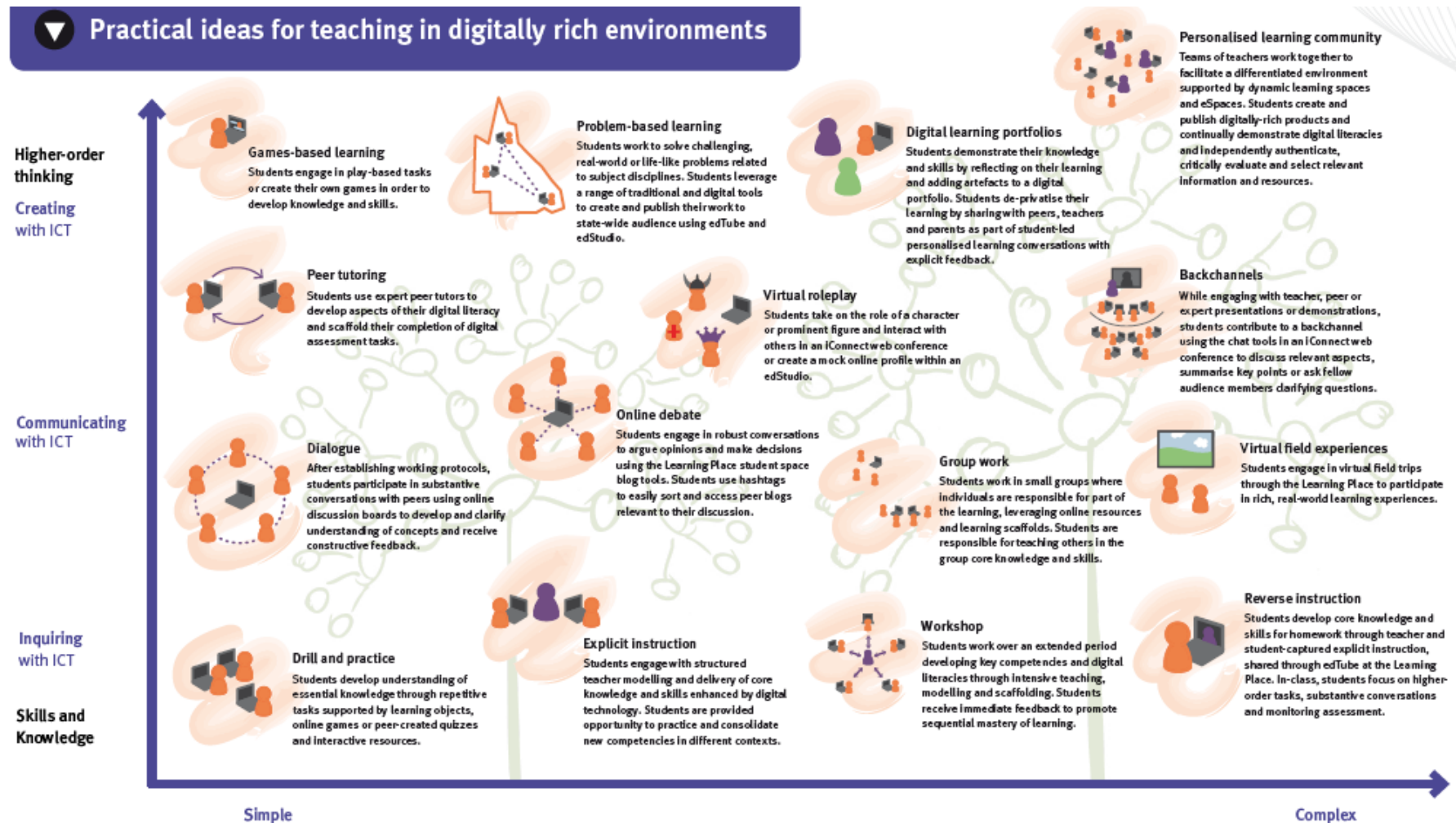


Figure 2.1.1: Practical ideas for teaching in digitally rich environments; source: [2]

### ICT tools for enhancing creativity

Only replacing traditional tools with ICT does not lead to creativity and innovation. Combining them could result in more space for both sides of education process [4]. Based on changes in the area of technologies as emergence and adoption Web 2.0 and cloud technologies, also nature of teaching and learning technologies becomes more social, collective and multimodal [5]. Convergence of telecommunication with computers has created numerous possibilities to use a variety of new technology tools for teaching and learning system [6]. ICT propose new space for access, extend, transform and share ideas in different styles and format. It helps the learner to share learning resources and spaces, promote learner centred and collaborative learning principles and enhance critical thinking, creative thinking and problem solving skills [6]. Tools like social networking sites (Facebook, My Space, Twitter), sharing bookmarks, multimedia (Flickr, YouTube), online gaming (Second Life) and blogging offer new opportunities for people to express their creativity, make it available to a large audience and get feedback. Innovation networks can be clusters, business ecosystems, and communities of practice, strategic alliances or living labs as well. Creativity could be enhanced by following tools [8]:

- **Blogs** develops creative thinking and writing skills of students, because they can post whatever they want and comment upon or share each other's material, openly write on topics that intrigue them and give vent to their ideas without having to worry about grading or grammatical errors. Blogging makes students feel responsible for their own learning and they are encouraged to incorporate creativity in their learning through them, which they could not do before. Well known and used are Edublogs, Blogger, WordPress.
- **Cartoon and Comic Strip Tools** are great tools for education, because students love cartoons and comics. Using them in teaching, students automatically get engaged more than ever. Creation their own comic strips or cartoon animations give them a chance to let loose their creative powers and delve into the world of creativity without any hindrance. One of websites with such resources is 'Cartoons for the Classroom' website.
- **Mind-Mapping and Brainstorming tools** boost students' creativity and provide them with different ways to interconnect their thoughts. Brainstorming on topics is a great collaborative way in today's teaching practices, which encourages students to think out of the box and creatively. Using ICT students can use a set of easy and free tools to make fantastic mind-maps and visual graphs to illustrate a topic or a concept. Applications like Online Brainstorming, Mind Mapping software, Whiteboards for distributed collaboration, SpiderScribe, Wise Mapping, ChartTool, Creately and more help to facilitate the idea generation (ideation) and allow a group

to participate in an ideation session without being physically together. More complex tools - Platforms for handling the creativity process and Crowdsourcing platforms – help to handle the creativity process itself.

- **Infographics** represent data in a colourful and catchy way. By using free tools for infographics, students can create awesome graphs, which make the interpretation of information easier and quicker. They can employ their creativity and imagination to create an infographic about a topic, concept or anything they want. They can share these infographics and also embed them into their classroom blog. Some free tools for creating infographics are Wordle, Tableau, InkSpace, and more.
- **Video and Audio tools** let the students to create their own videos/audio output and share them with their class on the class blog or school website. Some video-making tools for students and teachers are Jing, Camstudio, Screenr, etc. Some audio-recording tools are Vocaroo, Audio Pal, Record MP3 and more.
- **Digital storytelling tools** presents a powerful way to communicate with others. It improves the creative skills of students and helps them explore the meaning of their own work and experience. Students can create their own digital stories with many available free tools, namely, Story Bird, PicLits, Slidestory and more. In present there are available also application for their mobile phones, using which students can create their story anytime and anywhere.
- **Games** are one of the best ways of promoting co-operation and creativity. Educational games keep students engaged with their study, ignite the interactive and imaginative element in their thinking and mould it towards creativity. Some educational games freely available online are Capital Penguin, Grammar Gorillas, FunBrain.com and more.

## Conclusion

As experience shows, students need a level of competency, which is less to do with functional skills as they use ICT naturally and without fear of failure. NetGen already think digitally but need to learn how to apply these powerful forms of technology, in ways that enable them to work creatively, to innovate and develop original outcomes, and using other sources ethically without plagiarising or meaning harm to others at the same time. [10]

Building a culture of open innovation requires rewarded teamwork and organizational changes that foster internal and external collaboration. Global innovation networks are forming. And it is key role of education to educate people able to collaborate and share their ideas with others without fear of failure.

## 2.2 Creativity techniques

*Creativity is self-fulfilling prophecy [51].*

### **Aim of the module**

The main aim of the module is to introduce the creativity, proficiency levels of creativity and explain and describe 4 creativity techniques which are used along with the more common and spread creativity techniques such as brain writing and brain storming.

### **Learning outcomes of the module**

After study of this module you will be able to:

- Characterize and describe 4 proficiency levels of creativity
- List 7 creative mind sets
- Describe and explain 4 creativity techniques

### **Introduction**

The creative process is an ongoing exercise. Everything you do that is not habit is creative. Harnessing this creative power and directing it toward new ideas and solving problems is where most people need help. [52]

Creativity belongs to the strategic skills and according to [49] it is one in a set of complete functional and behavioral qualities that, when fully realized, can help lead to professional success.

Main objectives of a creative thinking process is to think beyond existing boundaries, to awake curiosity, to break away from rational, conventional ideas and formalised procedures, to rely on the imagination, the divergent, the random and to consider multiple solutions and alternatives [54].

The table 2.2.1 shows the Proficiency levels of creativity

<b>Level 1: Basic</b>	<b>Level 2: Intermediate</b>	<b>Level 3: Advanced</b>	<b>Level 4: Expert</b>
Generates new ideas regarding his or her job	Generates many new and unique ideas	Develops innovative ideas and methods of doing things	Consistently generates and employs original ideas for himself or herself and for others, tackling both simple and complex problems
Tries old solutions to problems, but will search for new methods when challenged	Searches for new and more effective methods, making connections between previously unrelated ideas	Pursues new methods and solutions, thinks outside the box, connects disparate ideas, is unafraid to use unorthodox methods	Uses analysis and cross-pollination of information from one situation to another to solve problems
Is seen as creative and a contributor in brainstorming settings	Is seen as original and value-added in brainstorming settings	Is seen as a motivator and guide for others to generate new ideas in brainstorming sessions	Is seen as bringing out the best in others in brainstorming sessions or one-on-one, leading them to discover new connections, new solutions, and new ways of doing their jobs

*Table 2.2.1 Proficiency levels of creativity*

According to Bryan W. Mattimore in [55] and [58] there are 7 creative mind sets:

- 1) Curiosity - without curiosity, the creative process never has the basic material it needs
- 2) Openness – and active and creative openness to others and their ideas
- 3) Embracing ambiguity – the capacity to entertain contradictory, ambiguous, and/or incomplete information
- 4) Finding and transferring principles – this mindset consists of 2 parts: mental habit of continually identifying the creative principles inherent in an idea and

the 2<sup>nd</sup> part: adapting the identified principle or idea to another context to create a new idea.

- 5) Searching for integrity – the desire to discover and the belief that there is a connection that unites the seemingly disparate elements one is juggling in his creative mind into a single integrated whole.
- 6) Knowingness
- 7) World creating – the ability to imagine entirely new worlds, places, people, and things

The above described creative mind sets are available to all of us. In order to consciously train and develop your creativity can use as simple technique as asking questions for each of the respectively:

- Why? How does it work?
- What is the learning here?
- What can resolve this apparent contradiction? Or, if both of these contradictions are correct, what ideas might they imply?
- What is the principle in this thing that I can apply to the other thing?
- What would make this a simple or beautiful solution?
- What is my intuition telling me?
- If I were to enter completely new world, what would I imagine that this world would look like.....?

### **Creativity techniques**

Creativity is not an innate quality of only a few selected people. Creativity is present in everyone. It can be learned, practiced and developed by the use of proven techniques which, enhancing and stimulating the creative abilities, ideas and creative results, help people to move out of their normal problem-solving mode, to enable them to consider a wide range of alternatives and to improve productivity and quality of work. “Creativity is thus constructed as a learned ability that enables us to define new relationships between concepts or events, which seemed apparently unconnected before, and which results in a new entity of knowledge” (European Commission 1998). Knowledge and information are the basis for creativity. Main points to increase or encourage creativity in a school or company are:

- to be happy, to have fun
- keep channels of communication open
- trust, failure accepted
- contacts with external sources of information

- independence, initiatives taken
- support participatory decision-making and employees' contribution
- experiment with new ideas

Below are given the creativity techniques chosen from among a numerous listed in many professional publications and used by trainers and managers. Provided that brainstorming and brain writing is widely known we have chosen some other techniques to broaden our view.

### **Story boarding**

It is a creativity technique for strategic and scenario planning based on brainstorming and used mainly by groups. It requires a leader, a secretary and takes place in a group of 8-12 people. The leader arranges the ideas generated by brainstorming in a logical order on a white board creating a story. This technique allows identify the interconnections of ideas and how all the pieces fit together. It can be used to identify issues, problems, solve a complex problem and determine ways to implement solutions. The story boarding process includes four phases: a) planning, b) ideas, c) organization and d) communication. Each phase includes a creative session (it takes 45 minutes) and a critical session, in which participants critique their story board.

- The planning phase begins with the problem definition or the issue being examined - the topic header. Purpose header, a miscellaneous column and other, normally 10 - 12, headers (column titles) are placed and brainstormed in order to give Ideas and then items, which are listed under the headers (the purpose header is listed first).
- The second phase - the ideas board, is to take one column from the planning board, which becomes the topic header and the items of that column become headers of new ideas.
- In the third phase - the organization board, participants identify who is responsible for implementing chosen solutions, what has to happen, and when.
- In the last phase - the communication board, participants identify who must communicate with for all of the events identified in the organization board to take place. Through the process, visual graphics to summarise or present relevant points are presented by the leader. These might be strategic models, places or things [56].

### **Do nothing**

Do Nothing is a technique described by Brian Clegg in his book *Crash Course in Creativity*.



According to [56] we can use this method in a situation when we make the assumption that something must be done about a particular issue/problem, but what happens if we "do nothing"? Stop and think for a while, either alone or as a group, about the outcomes if nothing were done.

This usually leads to one of three possible outcomes;

- The problem doesn't need to be solved
- You will have a better idea of the benefits of solving the problem
- You will have generated some alternative problems to solve

### **Lotus Blossom**

According to [60] this technique can also be used in scenario planning and is very useful for forecasting strategic scenarios. It is designed for groups and is used to provide a more in-depth look at various solutions to problems. It begins with a central core idea surrounded by eight empty boxes or circles. Using brainstorming, eight additional ideas (solutions or issues) are written in these boxes. In the next step, each of these eight ideas becomes the core of another set of eight surrounding empty boxes, which are filled in by new ideas using brainstorming. The process continues until a satisfactory solution or a sufficient number of ideas have emerged as described e.g. in [56].

### **Checklists**

This creative technique is used mainly for product improvement or modification. It involves applying a series of words, verbs, adjectives or phrases contained in checklists or tables to an existing product or service or its attributes. Osborn's Checklist is the best known and includes the verbs: put to other uses, adapt, modify, magnify, minify, substitute, rearrange, reverse and combine. Each verb contains also an expanded definition in the form of questions. For example, the description of the verb substitute is: Who else instead? What else instead? Other ingredient? Other material? Other process? Other power? Other place? Other approach? Other tone of voice? [53]. The method is to apply each of the verbs and its expanded description to a product or service. Osborn's Checklist, also known as SCAMPER, which letters refer to the actions Substitute, Combine, Adapt, Magnify, Put to other use, Eliminate and Rearrange.

### **Computer-based creativity techniques**

Computer-based supporting techniques to stimulate the human creative process have an immediate and pragmatic aim, which is the implementation of computational models (computer software) for generate and organize ideas for

creative work. They are used more frequently in research planning, product design, knowledge acquisition, decision making, motivation, etc. We can distinguish groups of computerized creativity techniques, such as AI models, Idea Processors systems and visualization and graphical systems.

### **Conclusion**

In this module we had a closer look at the creativity and its definition. We explained and described the 4 Proficiency levels of creativity, introduced 7 creative mind sets and the simple technique of asking questions for each of the named creative mind sets in order to be able to consciously train and develop our creativity. In the main part of the module we introduced 4 creativity techniques which are used along with the more common and spread creativity techniques such as brain writing and brain storming.

## 2.3 Adult education – innovative didactics

### Aim of the module

The aim of this module is to raise awareness on the new concepts in adult education. As SPACE project is about online collaboration we highlighted the brand-new learning theory “Connectivism” and its differences from other (adult) educational models. Teachers and trainers (as well as learners and mediators) are advised to get to know about this theory and how it is reflected in real life. The module includes a short description of main learning theories, a more detailed insight into the theory of Connectivism and a chart on the comparison of various models. Further references include examples on the application of the model and further studies on adult education.

### Learning outcomes of the module

- Identify various learning theories
- Making teachers and trainers adopt the right learning-teaching method to their given group
- Get acquainted with characteristics of Connectivism
- Find motives for engagement in applying these new techniques
- Be able to overarch the educational differences between generations

### Introduction

Adult education, innovative, and didactics: these are the three key words we need to understand in order to scheme the tendencies of modern pedagogical didactics in the field.

**Didactics** is understood as the art of teaching. It covers a wide range of factors which characterizes teaching. As of its origin having a connotation with moral issues, we tend to refer to formal education and its setting. However, as we will see, it goes beyond the normal boundaries of classroom education and especially with adults expands too many factors with a lot of focus on non-formal and informal education.

**Adult education** is relatively a young concept in the history of education. Traditionally education was regarded as something related to children and youngsters in classroom environment. If we consider famous pedagogues like Comenius for example, we understand that a lot of techniques, methodologies, classroom arrangements and in general pedagogic concepts were meant for the teaching of young generations in an officially organized setting.

However, adults have other backgrounds, needs, expectations and capacities than children and therefore new pedagogical methods should be applied with them.

Although there have been numerous studies, researches carried out and methodologies developed for this age group, the teacher training in many countries still focuses on training pedagogues for schoolchildren and therefore adult education frequently does not get the required professional and varied attitudes.

**Innovative** means “introducing or using new ideas or methods” (15) (<http://www.merriam-webster.com/dictionary/innovative>). It is not that evident how we decide what is considered to be innovative. There are many methods which are considered to be innovative although they had been introduced into pedagogy a longer time ago. There are also older didactics applied in newer fields which in the given area appears to be very innovative. In this chapter we are going to give some examples out of the tendencies that characterize modern didactics in adult education.

### **The framework of didactics**

To understand the framework of the didactics used by teachers, we need to get an insight into the various learning theories in pedagogy. Learning theories determine a lot of factors in teaching. The way a teacher thinks about its students learning styles and concepts is reflected in the learning theory. There are various views and categorization about learning theories. The most frequently mentioned ones are behaviourism, cognitivism, constructivism and (lately) connectivism.

1. Behaviourism is interested in looking at behaviour and observable changes. Therefore behaviorism in instruction focusses on generating new behavior patterns.
2. Cognitivism is interested in looking at the thought processes behind the behavior. Therefore cognitivist learning theory stresses acquisition of (including reorganization) of cognitive structures.
3. Constructivism claims that knowledge is constructed through the interplay of existing knowledge and individual (or social) experience. (source)
4. Connectivism is a brand-new approach, which claims that learning “is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing.” (16)

Out of the above four main learning theories Behaviorism and Cognitivism are regarded to be more traditional approaches to epistemology and learning-teaching, while Constructivism and Connectivism are regarded to be more modern and innovative approaches. However, we cannot claim that one is better than the other

in all circumstances. Pedagogues will always need to consider their target audience, their possibilities, resources and materials and many other factors to decide which pattern they can adopt to their present teaching “mission”.

As SP4CE project deals with the collaboration in virtual environment with a brand-new open innovation aspect, we thought it important to highlight connectivism and focus on its more innovative aspects.

### **Connectivism in a nutshell**

Connectivism is called a learning theory for a digital age. It seeks to explain complex learning in a rapidly changing technological and networked world. Knowledge is born and gets obsolete so fast, that getting to know facts and information is overcome by adopting to the changing knowledge base and learn how and where to get updated information and knowledge. According to this model the main channel of knowledge and information change is networking. It is important to identify connections and patterns and make a link among various nodes of knowledge bases. “The connections that make us able to learn more are more important than our current state of knowing” (17)

George Siemens, the main propagator and ideologist of connectivism lists the main features of Connectivism as of the following:

Principles of connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

### **Comparison between various learning models**

The challenge for the teachers, trainers and moderators of today is to use the potentials of new teaching tools including dominantly ICT –offered tools and also to be updated to the new learning styles and demands of the learners. It is possible

that learners are not prepared fully yet to use modern technology and to gain and process new information in ways Connectivism would offer. This is why it is essential that a teacher be prepared also in theory about various learning styles and models and adapt to its audience. Below we introduce George Siemens's chart on various learning models to help teachers and trainers orientate themselves:

<b>Property</b>	<b>Behaviourism</b>	<b>Cognitivism</b>	<b>Constructivism</b>	<b>Connectivism</b>
How learning occurs	Black box—observable behaviour main focus	Structured, computational	Social, meaning created by each learner (personal)	Distributed within a network, social, technologically enhanced, recognizing and interpreting patterns
Influencing factors	Nature of reward, punishment, stimuli	Existing schema, previous experiences	Engagement, participation, social, cultural	Diversity of network, strength of ties, context of occurrence
Role of memory	Memory is the hardwiring of repeated experiences—where reward and punishment are most influential	Encoding, storage, retrieval	Prior knowledge remixed to current context	Adaptive patterns, representative of current state, existing in networks
How transfer occurs	Stimulus, response	Duplicating knowledge constructs of “knower”	Socialization	Connecting to (adding) nodes and growing the network (social/conceptual/biological)
Types of learning best explained	Task-based learning	Reasoning, clear objectives, problem solving	Social, vague (“ill defined”)	Complex learning, rapid changing core, diverse knowledge sources

*Table 2.3.1 What is connectivism? George Siemens, September 12, 2009*

## **Conclusion**

The challenge for today's teachers, trainers and moderators is to consider the changing environments and methods of learning and to adapt their teaching methods accordingly. This requires a totally new point of view of many factors of teaching, including the role of the teacher, classroom arrangement, the role and responsibilities of learners, as well as aims and objectives and required outcomes of learning and many more.

In today's teaching (and in SPACE project) the special challenges of collaboration are:

- Adults learning with an older mind-set in a modern learning environment
- Generational gap between learners (both students and business people) and mentors in any direction
- Technologies used which do not offer the technological background required for new type of learning and collaboration.

## 2.4 Collaborative learning from consultants' needs point of view

### **Aim of the module**

The aim of this module is to raise awareness regarding the benefits of collaborative learning between learning and business field. It will show examples and methods of sharing knowledge and experience and give motives to learners to participate in the collaborative process.

### **Learning outcomes of the module**

- Identify the beneficiaries
- Acknowledge the advantages and opportunities of collaborative learning
- Get acquainted with open innovation models
- Find motives for engagement in the process

### **Introduction**

Collaborative learning is the situation when two or more persons learn together. The main concept is that persons involved interact, using the resources and skills of each other, asking one another for information, peer evaluating their ideas, exchanging feedback, etc.

The process can be implemented face-to-face (e.g. discussions, group study), from distance (e.g. online forum, chat room, e-learning platform, wikis etc.) or both combined as a blended solution.

Collaborative learning used to be more common among students who form a study group or it could be through a student-teacher relationship. Nowadays, collaborative learning involves companies as well, forming various types of collaborative groups: learning communities, communities of practice, project teams and other.

### **Potential beneficiaries of collaborative learning**

There is no doubt that an organization can benefit from building communities. The real question is what kind of community is more appropriate to be developed. Collaboration between companies and schools involves a process of dynamic exchange of information usually through an online network. Some types of collaborative networks are the following:



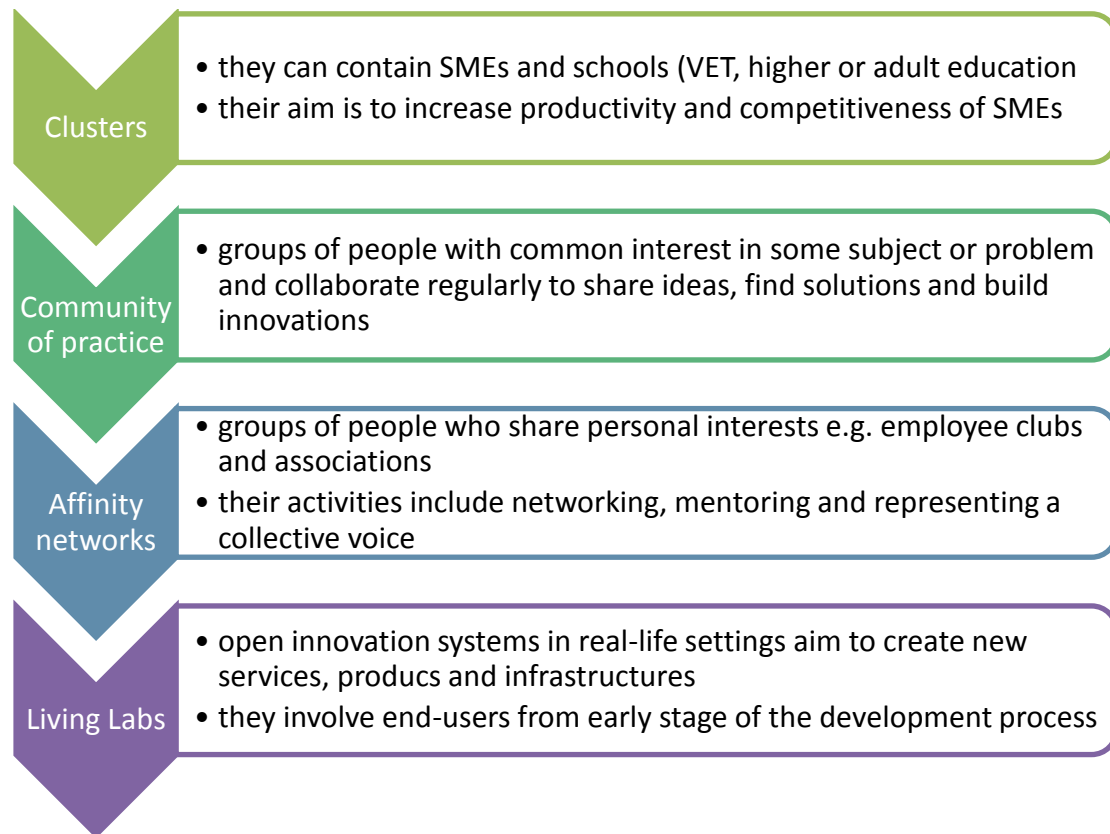


Figure 2.4.1 Types of collaborative networks

### Opportunities derived by collaborative learning

From the link between the education and business worlds arise benefits both for innovation and learning. The schools and/or learning providers can exchange their research results and fresh minds of their students thinking out of the box, with real business world challenges for their students.

Education is the first step for the student but in order to help the student find the best career for him/her-self, the contact with the current business trends should take place in parallel. In that way, students are up-to-date to face business market opportunities, they can choose their career path and development more consciously and moreover they obtain the feeling of usefulness watching their research results turn into real development plans for businesses.

On the other side, companies can use the research results from the students in their R&D processes and exploit the creativity of fresh young minds with the potential of thinking outside the box. In addition, the HR departments could use the interaction with students in order to find the best candidate for a job position. Testing the applicants in company's real activities, employers can recognize the students' skills

to transfer their theoretical knowledge into practice, while the students can find out if this particular job suits best his/her potentials.

Therefore, collaborative learning can be a win-win solution for both parties:

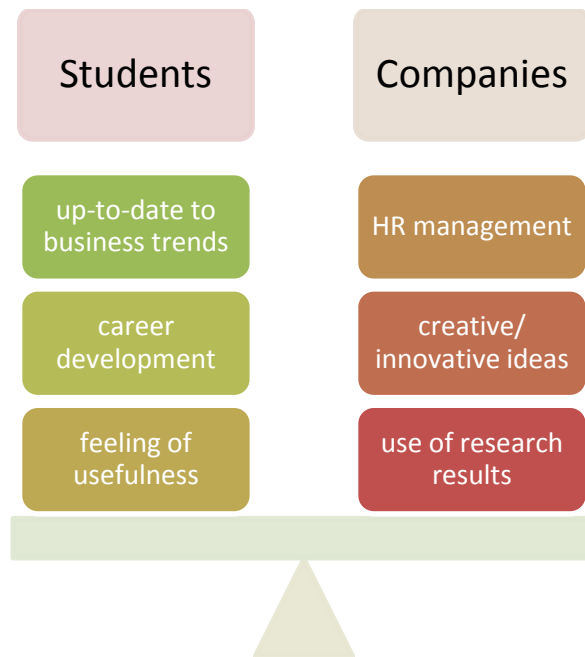


Figure 2.4.2. Opportunities from Collaborative learning

### Open innovation models

Open innovation derives from the idea that an organization interacts with its environment and there is free flow of ideas inside and outside of it. “Free” does not mean without financial cost, as payments of intellectual rights and license fees could be involved. It means that there is sharing and accessing to information and technology in an open-ended way.

Problem solving instead of relying exclusively on the internal skills and knowledge pool of the organization, it involves external players in the innovation process in order to acquire information on needs or solutions.

These models could bring closer organizations such as universities, SMEs, start-up companies, suppliers and customers as well.

Some examples of open innovation tools are lead-user method, toolkits, innovation or idea competitions, broadcast search platforms and open innovation communities. The tools can be integrated at different stages of the innovation process [48].

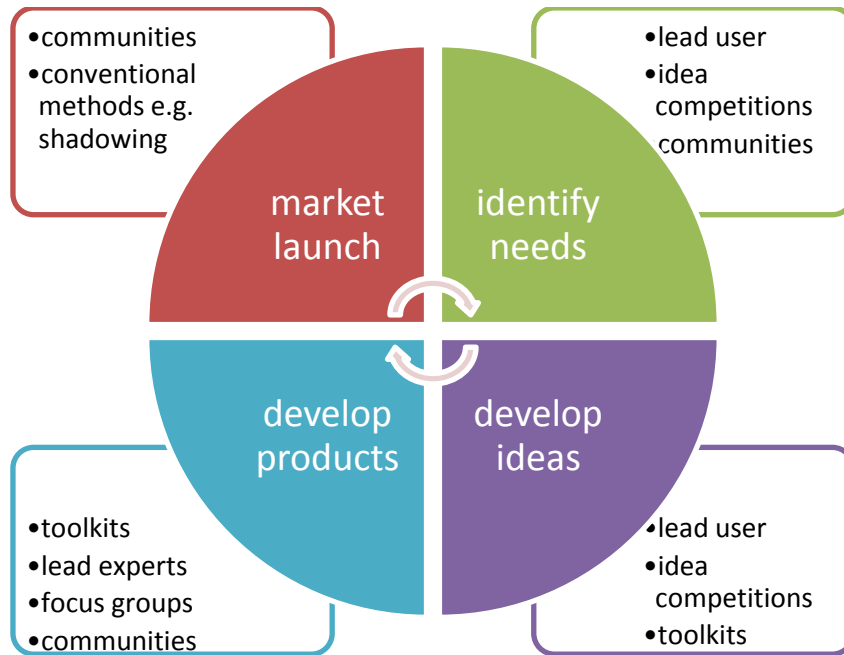


Figure 2.1. 3 Open innovation models and tools

## Conclusion

Collaborative learning promises more effective and efficient generation of ideas and solutions and mutually benefits both learners and companies. Learners are motivated to get involved in real work based challenges, while companies get input for their innovation process. Learners can get in contact with real business opportunities before they choose their career development, while companies can achieve effective HR management, finding the most efficient candidate for a job position.

## 2.5 Strengthening competencies with MOOCs

### Aim of the module

This module presents a quick view of the state of art of MOOCs in context of history and institutional involvement. We suggest considering MOOCs as open, flexible, innovative learning environment for those who are looking for new competencies and new jobs.

### Learning outcomes of the module

- ✓ Understanding MOOC concept and benefits for institutions and individuals
- ✓ Recognising of MOOCs good practice

### Introduction

*“Education is no longer a one-time event but a lifelong experience. Education should be less passive listening (no long lectures) and more active doing. Education should empower students to succeed not just in school but in life.”*

<https://www.udacity.com/us>

*“New skills and knowledge makes you a more valuable employee, whether working for yourself, for an employer, or future employer. With today’s workplace changing faster than ever, it is essential everyone keeps learning new and updating old skills to remain or become competitive in the workplace. ALISON is for anyone taking their first step to a new or better job. ALISON is as individual as you are.”*

<http://alison.com/subsection/?section=about>

### Two example definitions of MOOC

“A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings and problem sets, many MOOCs provide interactive user forums to support community interactions between students, professors, and teaching assistants (TAs). MOOCs are a recent development in distance education which was first introduced in 2008 and emerged as a popular mode of learning in 2012.” [30]

“Online courses designed for large numbers of participants that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for

free". In Europe according to the results of the survey there is a strong support of this definition [31].

### **The beginning of MOOCs**

Massive Open Online Courses (MOOCs) started in Canada and the US. They have received considerable media coverage since the beginning of 2012. Their rise of recognition was supported by the well know service providers such as Udacity, Coursera and Edx.

MOOCs appeared in Europe in 2013. They started with the pan-European initiative OpenupEd and different (regional) MOOC platforms as FutureLearn, Iversity, FUN, UNEDcoma, Miríada X. In September 2013, the European Commission launched the initiative Opening Up Education to further enhance the uptake of Open Education in Europe (European Commission, 2013). Recently the European Commission funded a number of MOOC projects for example EMMA.

### **Example results of surveys about MOOCs**

From July 24, 2012, through Sept. 21, 2014, an average of 1,300 new participants joined a HarvardX or MITx course each day, for a total of 1 million unique participants and 1.7 million total participants. With the increase in second and third versions of courses, the researchers found that participation in second versions declined by 43 percent, while there was stable participation between versions two and three. There were outliers, such as the HarvardX course CS50x (Introduction to Computer Science), which doubled in size, perhaps due to increased student flexibility: Students in this course could participate over a yearlong period at their own pace, and complete at any time. To summarise the survey the following statements were formulated:

1. Participation in repeated courses has declined and then stabilized.
2. A slight majority of MOOC takers are seeking certification, and many participants are teachers.
3. Academic areas matter when it comes to participation, certification, and course networks.
4. Those opting for fee-based ID-verified certificates certify at higher rates.

Hollands & Tirthali (2014) reviewed literature and interviewed 83 individuals of 62 US institutions about MOOCs. They report a variety of institutional goals, which fell into one of six categories:

1. Extending the reach of the institution and access to education
2. Building and maintaining brand
3. Improving economics by lowering costs or increasing revenues

4. Improving educational outcomes for MOOC participants and on-campus students
5. Innovation in teaching and learning
6. Conducting research on teaching and learning

## Conclusion

MOOCs are a new form which helps to educate many people and provide a solution to the increasing need for an affordable higher education. By using ICT for digitalizing education content, enabling mass distribution and personalized learning they also support reducing costs of education. Flexible, innovative learning approaches and user friendly delivery methods could help to improve the quality and relevance of higher education. MOOCs support transversal competencies, e-skills for the digital era, creativity and flexibility and a solid understanding of the chosen field and finally they help finding jobs [31].

More information regarding massive open online courses (MOOCs) and other forms of open educational resources (OERs) can be found in [34].

www.youtube.com/watch?v=4tGkuc0Zy7c

The screenshot shows a webpage from CLASS CENTRAL. The top navigation bar includes 'CLASS CENTRAL', 'Courses', 'Subjects', 'Credentials', and 'MOOC Report', along with social media icons for Facebook, Twitter, and Google+. The main header features the title 'Ten Most Popular MOOCs Starting in October 2015' and a sub-header 'The best new courses starting in October 2015'. Below the header, the article is attributed to '3 minute read written by Dhawal Shah'. A share bar indicates 49 shares, with counts for Facebook (30), Twitter (15), Google+ (2), LinkedIn (2), and Email (0). The article content includes two sections: 'Operations Management' and 'Cloud Networking', both from the University of Illinois at Urbana-Champaign via Coursera. The 'Operations Management' section describes learning conceptual frameworks and tools. The 'Cloud Networking' section discusses the cloud's key capabilities. On the right side, there are sections for 'FEATURED POSTS' and 'RECENT POSTS', each with a list of article titles and dates. At the bottom of the page, a footer contains the text 'MOOC Course Report: 398 Free Online Courses Starting in October 2015' and a 'READ' button.

CLASS CENTRAL Courses Subjects Credentials MOOC Report

# Ten Most Popular MOOCs Starting in October 2015

The best new courses starting in October 2015

3 minute read written by Dhawal Shah

49 SHARES

Facebook 30 Twitter 15 Google+ 2 LinkedIn 2 Email 0

### Operations Management

University of Illinois at Urbana-Champaign via Coursera

In this course you will learn conceptual frameworks and tools that can help you to better understand operations and see the opportunities and challenges so that you can you can make informed decisions about the design of your operations and get more out of them.

[Go To Class](#) | Next Session : Oct, 2015

### Cloud Networking

University of Illinois at Urbana-Champaign via Coursera

The network is what makes the cloud. The cloud's key capabilities—the ability to share

FEATURED POSTS

- School's Out For... Never  
September 15, 2015

RECENT POSTS

- 22 Internet of Things(IoT) Courses to Help Build a Connected World
- In-Depth Review: Planetary Boundaries and Human Opportunities
- How Coursera Cracked The Chinese Market
- In Depth-Review: Explore

MOOC Course Report: 398 Free Online Courses Starting in October 2015 [READ](#)

## 2.6 Methods of identification of enterprise's needs

### **Aim of the module**

This module is focused on the description of most commonly used approaches for identification of enterprise's needs, which usually include gathering large amount of information from the company, and methods for that data analysis.

### **Learning outcomes of the module**

The reader will read and learn about the operational and other needs of the enterprises and will be accustomed with the role of stakeholders; about the methods of identification of enterprises needs and most common approaches to those methods; about the rules and regulations connected with the process and finally about the selected methods used for the analysis of gathered information.

### **Introduction**

The enterprise has key stakeholders that have operational needs they would like the enterprise to address and the enterprise exists to meet these needs [63]. These needs must be identified and assessed in terms of their relevance to the enterprise and the relative priorities of these needs compared to each other and to the priorities of the enterprise itself. An operational need is an expression of something desirable in direct support of the enterprise's end user activities which can include such things as retail sales, entertainment, food services, and business travel.

Enterprise needs can relate to any or all of the following: countering a perceived threat, meeting a policy goal, doing existing business more efficiently, taking advantage of technological opportunities, meeting new operational needs, replacing obsolete systems, creating integrated enterprises with others, and so on.

In addition to operational needs, there are enterprise needs that relate to enabling assets the enterprise has in place that allow the mission to be accomplished. Enabling assets are things such as personnel, facilities, communication networks, computing facilities, policies and practices, tools and methods, funding and partnerships, equipment and supplies, and so on. An enterprise need is an expression of something desirable in direct support of the enterprise's internal activities. Internal activities include such things as market forecast, business development, product development, manufacturing, and service delivery.



The main goal of enterprise needs which are usually related to the efficiencies achieved through the activities is to enhance productivity, and find and eliminate waste. Waste represents that which does not contribute to the enterprise mission or that cannot reasonably be expected to be accomplished by the enterprise.

### **Methods of identification of enterprise's needs**

There are many approaches for the identification of enterprise needs and they can involve various tools and the adoption of an analytical and diagnostic approach to try to determine what is required. According to practice and official documents from European Union and the International Labour Organization [64] methods of identification of enterprises needs shall be as follows:

- Labour force surveys/interviews
- Enterprise/employer surveys/interviews
- National occupational and skills databases
- Studies at sector level

All mentioned methods can be used parallel for better identification of enterprise's needs.

In general the process of enterprise needs identification can be described in the following important steps:

- Stakeholder analysis
- Selecting and using the research methods to identify company needs
- Planning identification of organizational, job and personal needs
- Data collection, analysis and presentation
- Reporting the data
- Sharing the results

Most commonly used surveys and interviews should contain sets of questions. It is essential to create easy to understand questions or provide proper description for avoid misunderstanding or different understanding of question. Number and form of questions (open or close) determine complexity of questionnaire/interview.

Organization of survey should meet ESOMAR (ESOMAR is the essential organisation for encouraging, advancing and elevating market research worldwide) rules and regulations [65] which are in general described below.

Basic principles for conducting the research:

- Market research shall be legal, honest, truthful and objective and be carried out in accordance with appropriate scientific principles.
- Researchers shall not act in any way that could bring discredit on the market research profession or lead to a loss of public confidence in it.

- Market research shall be conducted with professional responsibility and conform to the principles of fair competition, as generally accepted in business.
- Market research shall be clearly distinguished and separated from non-research activities including any commercial activity directed at individual respondents (e.g. advertising, sales promotion, direct marketing, direct selling etc.).

Honesty:

- Market research shall not abuse the trust of respondents or exploit their lack of experience or knowledge.
- Researchers shall not make false statements about their skills, experience or activities, or about those of their organisation.

Transparency:

- Researchers shall promptly identify themselves and unambiguously state the purpose of the research.
- Respondents shall be able to check the identity and bona fides of the researcher without difficulty.
- Researchers shall on request allow the client to arrange for checks on the quality of data collection and data preparation.
- Researchers shall provide their clients with appropriate technical details of any research project carried out for the clients.
- Researchers shall ensure that market research projects are designed, carried out, reported and documented accurately, transparently and objectively.

Respondents shall be informed before observation techniques or recording equipment are used for research purposes, except where these are openly used in a public place and no personal data are collected. If respondents so wish, the record or relevant section of it shall be destroyed or deleted. In the absence of explicit consent respondents' personal identity shall be protected. Researchers shall have a privacy policy which is readily accessible to respondents from whom they are collecting data and a collection of data when collecting personal information from respondents researchers shall ensure that:

- respondents are aware of the purpose of the collection;
- respondents are aware of any quality control activity involving re-contact.

Personal information collected and held shall be:

- collected for specified research purposes and not used in any manner incompatible with these purposes;
- adequate, relevant and not excessive in relation to the purpose of the research for which they are collected and/or further processed;
- preserved no longer than is required for the purpose for which the information was collected or further processed.

Security of processing Researchers shall ensure that adequate security measures are employed in order to prevent unauthorised access, manipulation to or disclosure of the personal data. If personal data are transferred to third parties, it shall be established that they employ at least an equivalent level of security measures.

Also public data, specific reports and sectoral analysis can be used for identification of enterprise's needs. Good example and source of information is Eurostat [66] database containing statistical information about enterprises in Europe. Statistical data can be used for identification of trends and prediction of future needs.

It is also important to use different sources of data (reports, statistical databases, and analysis results) for complex and reliable identification of needs.

### **Methods of data analysis**

For the study of the needs of the company to be effective the appropriate tools for the analysis of the information obtained should be used [67]. Every diagnosis must be carried out in the belief that we are going to solve the really significant problems, and that will solve the problem at its source instead we only deal with the consequences. There are three commonly used methods that can lead us to identify the wanted needs.

### **Methodology 5W (5 why)**

This method [68] involves repeatedly asking the question "why", so that the nature of the problem and its solution becomes more obvious. The method name means to ask 5 questions but not always 5 questions have to be asked - sometimes just 3 or 4 questions are enough but there are also times when to get to the bottom of the problem it is necessary to work with more questions. This method addresses two aspects. The first concerns the causes of the problem (why the problem arose) and the second its determination (why not detected the problem as soon as there was one).

Using the method can be divided into three steps:

- collecting information about the problem, we analysed the following aspects:
  - what is actually happening and when it happened,
  - what is the scale of the problem, if we have problems, etc.,
  - what kind of threat this issue poses (for the customer, user, company, etc.),
- find the right people that can help determine the cause and the exact description of the problem,
- analyse the problem, address and correct it.

Based on analysis of 5W in the next stage is made proposals for preventive and corrective measures to eliminate the sources of emerging problems.

### **Ishikawa diagram**

The second proposed approach is the use of Ishikawa diagram. The diagram is a popular tool used to conduct the analysis of cause and effect. Using this diagram we can demonstrate a significant relationship occurring between the causes and discover the source of the failure or malfunctioning of the process. In this method causes of the problems are divided into six basic categories:

- methods,
- materials,
- management,
- people,
- machines,
- environmental issues.

Depending on the field in which the graph is used you can also be used other categories. Each category's core is then extended by a further cause of detailed until completely identify the cause of the problem.

### **Pareto-Lorenz analysis**

This analysis [69] is the separation of factors and trends relevant from marginal. By doing it we can choose to improve those causes that lie at the root of many problems in the company, which processes predict optimization pays off and designate to improve the most important products in terms of sales.

This approach arises from the fact that any company acting in a situation of limited access to resources, must choose significant problems putting aside insignificant problems for later. Improving process efficiency by half serving most of the product of the company should bring much more benefits than the more significant improvement of process that supports the margin of its activities.

### **Conclusion**

As it was presented there are many factors and many ways that the business needs can be identified in the enterprise. If the procedure is not performed in a proper way then the organization would not realize the benefits of identifying some business needs that need to be addressed, possibly gaining greater competitive advantage, possibly achieving strategic goals or taking advantage of an opportunity presented in the market. This can have a direct effect on the strategic success, and bottom line, of the organization. Once identified, the business need should be documented in the Business Case to initiate a project to develop a solution for this business need. The

way the business need is defined determines which alternative solutions will be considered, which stakeholders will be consulted and which solution approaches will be evaluated. After business needs identified the enterprise can initiate projects to find proper solutions for the found problems which shall lead to the better addressing of enterprise needs.

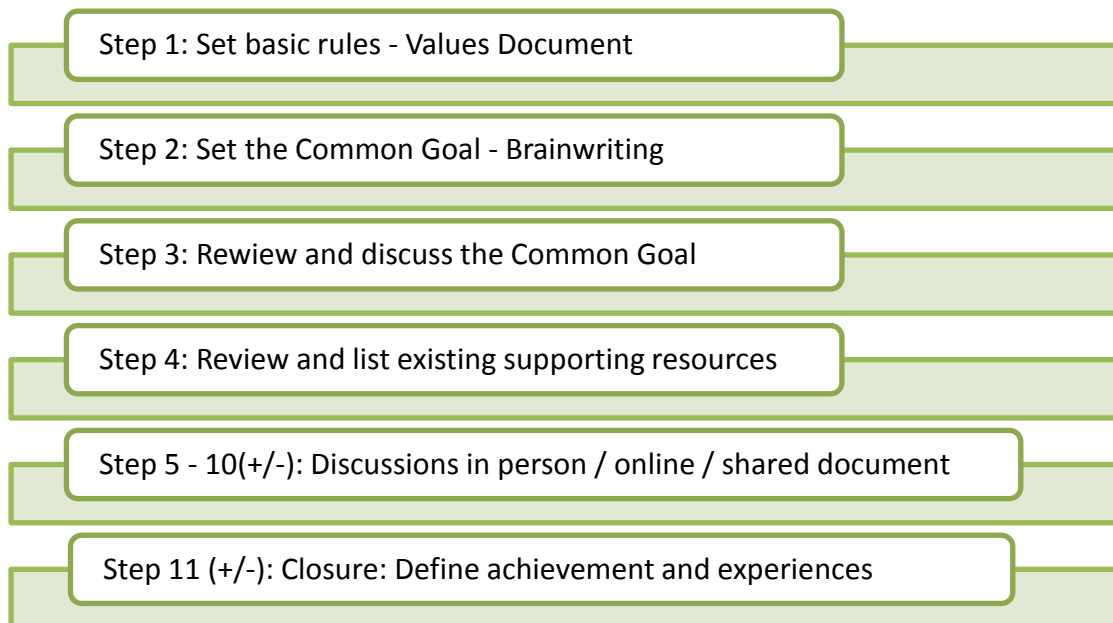
## 3. Online mentoring and coaching

### 3.1 The 'virtual company pedagogical model'

The 'virtual company model' had been used as a pedagogical concept in the OpenInn project, which was one of the former projects of SP4CE project. In the following section the method will be described in details to help the teachers (called mentors in SP4CE project) in their mentoring partly based on the material of OpenInn. The main goal of the innovative didactic method 'virtual company pedagogical model' is to create a strong intrinsic motivation in the learners, students, as the stronger motivation creates stronger commitment.

Intrinsic motivation: "Stimulation that drives an individual to adopt or change behaviour for his or her own internal satisfaction or fulfilment. Intrinsic motivation is usually self-applied, and springs from a direct relationship between the individual and the situation. It is very important factor in the design of learning or training course. [46] "

Steps of the 'virtual company model' based on OpenInn project outcomes [47]:



*Figure 3.1.1 Steps of the 'virtual company model'*

- **Step 1: Set basic rules - Values Document**

The first step is to set the basic rules and values in the group, and also to agree on them with the students. Each student is asked to give her/his definition for every point of the list below and share it with his/her groupmates in the document called 'Values Document'. This document can be in the form of a Google Docs or any other shared document.

Points to be set in the Values Document:



*Figure 3.1.2 Points to be set in the Values Document*

If discussion is needed to clarify part(s) of it, it can be done in the same Values Document or by using Skype or Google Talk or during a personal meeting; or any other form that fits to the group. The document with a short description of each point can be published on a blog and will be marked as the common framework for cooperation. When the Values Document is shared and validated, the group becomes a team.

- **Step 2: Set the Common Goal – Brainwriting**

In the next step the Common Goal of the team has to be defined through a brainwriting session, with the help of Google Docs or other shared document where each learner will independently put his/her ideas. The brainwriting can also be done also in person if it is a possibility. At this stage the team defines a common goal. The characteristics of the common goal shall follow the PURE SMART model that was

also developed in OpenInn project.<sup>i</sup> This means that the members in the team shall be asked to set the Common Goal with bearing in mind the following characteristics:



*Figure 3.1.3 The questions for common goals setting*

- **Step 3: Review and discuss the Common Goal**

When the brainwriting section is done, the results shall be reviewed, discussed and agreed. The teacher/mentor will guide the team through questions to an agreement on the Common Goal. The Common Goal shall be summarised in 1 or 2 sentences.

- **Step 4: Review and list existing supporting resources**

When the Common Goal is set, the team builds up a list with points where “positive things” are defined, this list can be written on Google Docs. The team shall make a



review of existing resources of the team: skills, knowledge, experiences, contacts, special backgrounds, sources of information, etc. – anything, that can be useful in the discussions. This “resource list” can serve as help in the later process, especially in cases of getting stuck. This phase is focused on the very positive aspects to create a good feeling that will help building up the next phase.

- **Step 5 - 10(+/-): Discussions in person / live online / shared document**

Having the ‘Values’, ‘Common Goal’ and ‘Resource List’ it is time for the discussions section. These meetings for the team could be in person, in (class) rooms or through Skype or Google Hangout programs. In the meetings students can share, check, test, support, develop their ideas and they are supported by the teacher/mentor on this work. Virtual meetings are also possible, e.g. for team members who need to check the status of teamwork at home. During these meetings the team itself can identify what working method they want to follow, for example they can work simultaneously on the same shared document of Google Docs.

How many discussions does a team need? It is totally up to the team and their resources. Maybe 3 discussions are enough or maybe more than 6 meetings/discussions are needed. What is important in the row of discussions is to have a closing discussion – this is described in the next step.

- **Step 11 (+/-): Closure: Define achievement and experiences**

The final meeting serves as a closure of the whole cooperation. During the final discussion conclusions are made, and the team shall analyse the work done by covering these points:

- what has been created?
- what has been learnt?
- what are the main experiences?
- what about the Common Goal?
- follow up of the project.

---

### **The role of the teacher /mentor**

In SP4CE project the teacher helping the students is called ‘mentor’. This role of the teacher /mentor is different from the classical teacher role, in this process the teacher is guiding the team through a series of processes to define and reach a common goal. This common goal is defined by the team itself in the early stage of the course, later on the teacher supports the whole process that will guide the team to the goal. The teacher /mentor will guide the students/learners in choosing their roles and promoting

mutual support among the learners. The roles in the student team are based on personal vocation and ambition of each student in the team.

In this approach the teacher is rather a facilitator to the group/team than a traditional teacher. The team's creative and innovative ideas will help to find solutions for the problems raised by the company in question. Therefore the teacher should be only a supportive "catalyser" and group moderator and not the leader of the group. Trainer, facilitator, advisor, and mentor – these roles should be in the foreground when dealing with the team.

### What should group facilitator should do / say?

Here is a short and basic list of proposed behaviour. The main idea is to allow creativity and cooperation to get as far as possible in the team's work and to be positive as much as possible. Using "and" as a starter of your sentence is adding things to the original idea and developing it further, while using "but" is followed by critical, negative remarks and not resulting in development. Therefore we suggest to use "and" instead of "but" when starting a remark, also the attitude should focus on the further development of the idea instead of criticising. Using "how" as question-start also enables more support and development, while "why" is looking for the causes or concentrating on the problem and driving attention away from the solution. (For more details please check the websites offered at further readings.)

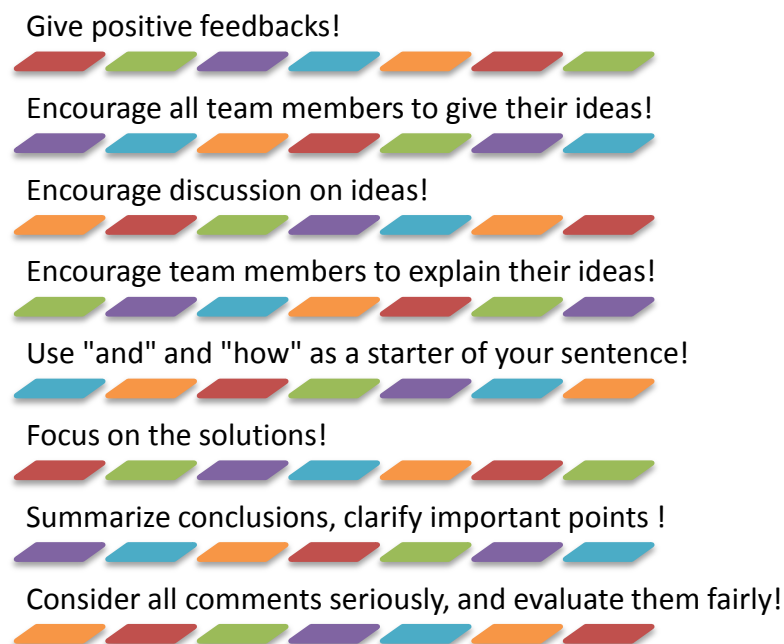










Figure 3.1.4 The proposed behaviour for group facilitator

### What a group facilitator should NOT do / say?

Here is the list of “not to do”-s, also short and basic. The main idea is to limit negative comments and behaviours in the team and also from the side of the mentor/teacher. ‘No’-s and ‘but’-s and negative critics do not allow the solutions to be developed, therefore please try to eliminate those in the team (and also from the teacher’s side). Also “why” is rather focusing on the reasons and not that much on the solution, so please also try to avoid questions starting with “why”. (For more details please check the websites offered in previous footnote.) Good luck!

- Do not make judgements!  

- Avoid criticism and negative remarks, be constructive instead!  

- Don't let one member to dominate the discussion!  

- Don't let yourself to dominate the discussion!  

- Don't let one point of view to rule the others!  

- Control your own preconceptions, try to forget them!  

- Avoid using "but" and "why" as a starter of sentences in the group!  

- Avoid "yes or no" questions, try open-ended questions instead!  


*Figure 3.1.5 The improper behaviour for the group facilitator*

## 3.2 Open Educational resources

### Aim of the module

This module presents a quick view of the state of the art of OER in context of history and institutional involvement. We suggest considering OER as a tool for gathering real learning experiences which can be linked to employer or professional sector requirements.

### Learning outcomes of the module

- ✓ Understanding of OER concept and benefits
- ✓ Ability to finding out a specific OER
- ✓ Recognition of OER good practice

### Introduction

In 2001 the Massachusetts Institute of Technology (MIT) announced the majority of its courses on the internet were for free [34].

Because the number of institutions offering free or open courseware increased, UNESCO organized the 1st Global OER Forum in 2002 where the term Open Educational Resources (OER) was adopted and defined as *“Teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work”* [35].

UNESCO believes that OER support not only a strategic opportunity to improve the quality of education but also facilitate policy dialogue and knowledge sharing. Having support of the Hewlett Foundation, UNESCO created a global OER Community wiki in 2005 to share information and work collaboratively on issues surrounding the production and use of Open Educational Resources. UNESCO has been developing a new, innovative OER platform which will offer selected UNESCO publications as OERs and allow communities of practice including teachers, learners, and education professionals to freely copy, adapt and share their resources. UNESCO is a member of the Open Educational Quality Initiative (OPAL) which is responsible for developing a Framework of OER Practices that improves quality and innovation in education. UNESCO offers several valuable links which are recommended for visiting [36], [37], [38], [39]

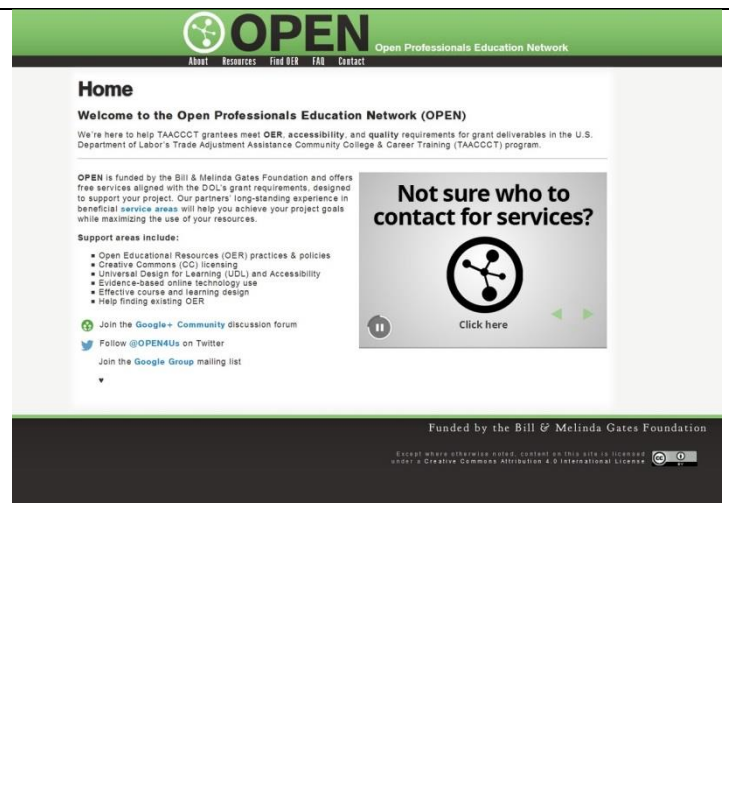
One of the most popular definitions was formulated by William and Flora Hewlett Foundation is following *"teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge"*[40]

The Organization for Economic Co-operation and Development (OECD) defines OER as: *"digitised materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research. OER includes learning content, software tools to develop, use, and distribute content, and implementation resources such as open licences"* [41].

The WikiEducator project suggests that OER refers *"to educational resources (lesson plans, quizzes, syllabi, instructional modules, simulations, etc.) that are freely available for use, reuse, adaptation, and sharing"* [42].

#### How can you find a specific OER?

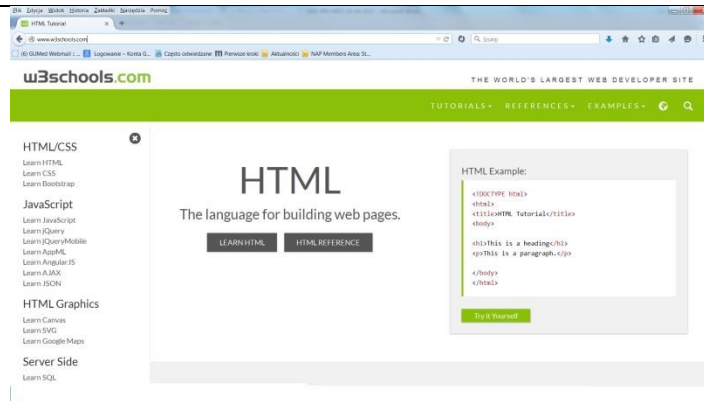
Reusing existing OER saves time and effort. There is no need to create something from scratch. Many educators look for single media elements to use within their courses, such as photos, graphics, videos, and audio. The page established by Open Professionals Education Network (OPEN) [43] <https://open4us.org/find-oer/#GeneralSearch> helps in finding openly licensed media elements.



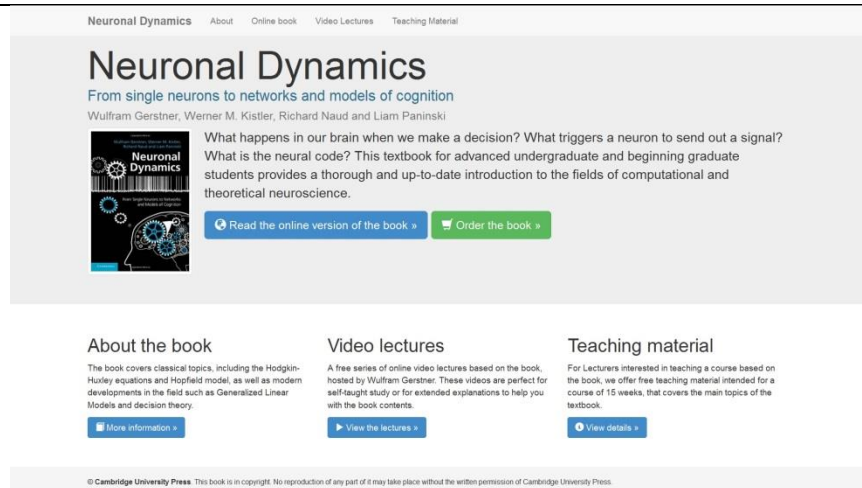
Picture 3.2.1 How to find specific OER

## Two example OER recommendations

“W3Schools is an educational website that provides web development tutorials. It covers topics like HTML, CSS, JavaScript, PHP, ASP.Net, SQL and many more. W3Schools is getting more than 35 million visits per month and it is the most popular web development website on the internet.” [44]



“What happens in our brain when we make a decision? What triggers a neuron to send out a signal? What is the neural code? This textbook for advanced undergraduate and beginning graduate students provides a thorough and



<i>up-to-date introduction to the fields of computational and theoretical neuroscience.”</i> [45]	
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Picture 3.2.2 examples of OER recommendations

## Conclusion

Example benefits of OER are following:

- ✓ enhancing opportunities for quality learning and flexibility of resources,
- ✓ freedom of access (e.g. at work/home/on placement),
- ✓ support for learner-centred, self-directed, peer-to-peer and social/informal learning methods,
- ✓ skills development through release of OER that can be re-used and re-contextualised in different subject areas,
- ✓ the possibility for testing course materials before enrolling,
- ✓ gathering real learning experiences which are linked to employer or professional sector.

### 3.3 Assessing creative results

#### Aim of the module

This module intends to show that creativity is not an abstract concept or a result itself. It should serve a purpose and the result of creativity should meet a specific goal. Therefore, it is required to include methods of assessment to value the level of creative results.

#### Learning outcomes of the module

- Learn how to assess creativity
- Practical feedback methods
- Identify assessment criteria for creative work
- Characteristics of assessment

#### Introduction

Creativity is a concept that could be given many different definitions, it could mean e.g. doing something new, producing something original, inspiring others, creating a feeling, generating a thought, etc. The assessment process of creativity starts at the beginning of a task and includes three steps:

1. identification of goals/ expected results,
2. selection of assessment criteria and the respective indicators of achievement,
3. agreement on the methods to gather feedback and tools to measure the assessment results

#### Why evaluate creativity?

Creative and innovative ideas do not always end up valuable for their creators. Many of them never get into the marketplace or even if they do they are not a commercial success. An early assessment of your creative idea will give you the opportunity to improve your idea or it will save your time from not wasting more thought and energy in a non-profitable process [49].

There are some important steps you can take to determine, such as:

- the technical viability
- the demand for the creative result
- the cost effective production
- the feasibility of commercialization

This initial assessment of achievability will rank your idea in one of the following categories:



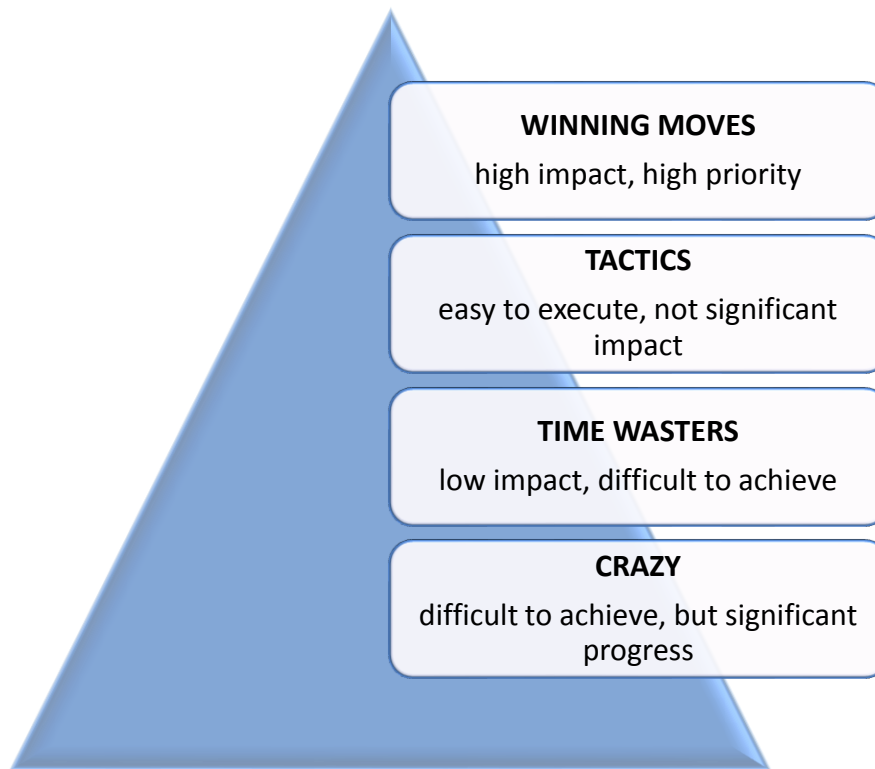


Figure 3.3.1 Categorization of ideas according to their achievability

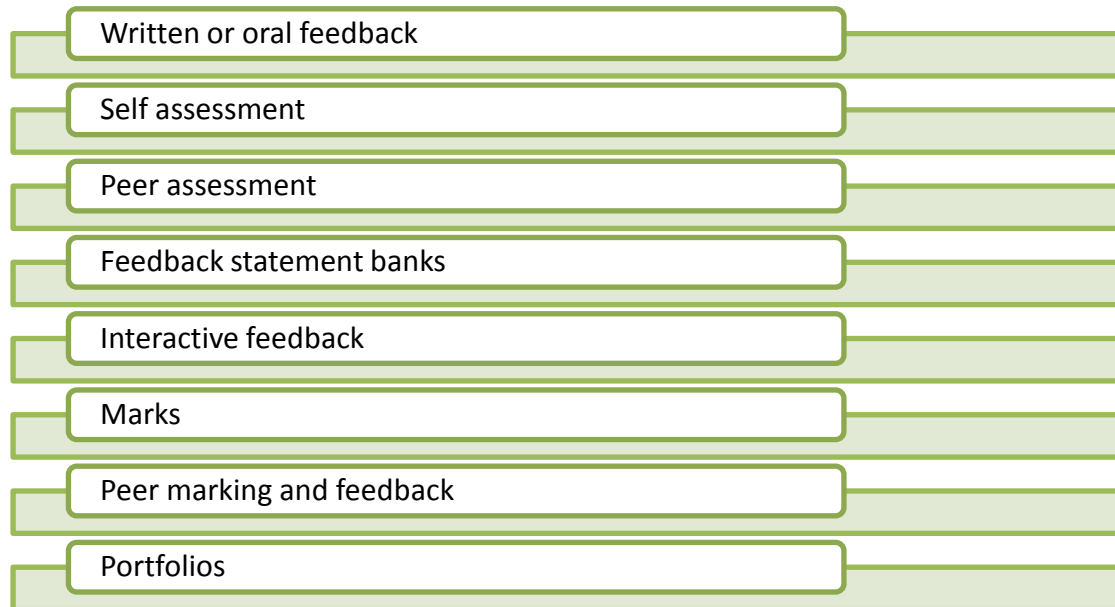
### How to assess creative results?

The process of assessment must be part of any project and it must start at its very beginning. The assessment models that simply give a feedback to the learners at the end of the learning process, do not allow improvement *during* the process. On the contrary, the assessment method should support adjustments in time, give advices, introduce of new ideas, identify problems and suggest solutions.

The methods of assessment should be more flexible and adapted to the strategy of the learning process.

The assessment of a creative process is more complex, because usually there is not a right or wrong answer. The goal of the assessment is to identify the strong and weak points and show the ways to improve the outcomes. It should provoke new ideas for further development and motives for harder efforts.

Some practical feedback methods are:



*Figure 3.3.2 Practical feedback methods to assess creative results*

### **Assessment criteria and indicators of achievement**

When we assess creative work we have to consider the following indicators:

- What was the initial idea?
- How many ideas derived from this?
- What are the perspectives of the ideas?
- What will be the final outcome (-s)?
- What is the significance of the expected impact?

Among others, the criteria of assessment could be the following:



*Figure 3.3.3 Criteria of assessment of creative work*

## **Conclusion**

Creativity is the intersection of three areas: expertise, creative thinking skills and motivation. It is a process of the subconscious but can be promoted in the right environment. Collaborative tasks require creativity and the results of the whole process should be assessed in a constructive way.

The choice of the assessment method should be made very carefully because it is important that assessing will result in motivation and reinforced confidence for the learner and not the opposite. Focusing on testing and criticizing could increase anxiety and have negative impact on creativity [50].

### 3.4 Supporting personalised learning processes

#### **Aim of the module**

The main aim of this module is to introduce the idea of personalization of education and personalized learning as well as the possible use of ICT to support the personalized learning. We will also explain the relations among personalized learning and lifelong learning.

#### **Learning outcomes of the module**

After studying this module you will be able to:

- Explain the term personalized learning
- Name the five typical key components of personalized learning
- Describe the possibilities of ICT use to support personalized learning

#### **Introduction**

The idea of personalization of education can be traced back to the XIX century, when Helen Parkhurst [59] created the Dalton Plan stating that each student can program his or her curriculum in order to meet his or her needs, interests and abilities; to promote both independence and dependability; to enhance the student's social skills and sense of responsibility toward others.

According to [58], the term personalized learning, or personalization, refers to a diverse variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students. The other definition given by [60] states that: Personalized learning is the tailoring of pedagogy, curriculum and learning environments by learners or for learners in order to meet their different learning needs and aspirations. Personalized learning is generally seen as an alternative to so-called "one-size-fits-all" approaches to schooling in which teachers may, for example, provide all students in a given course with the same type of instruction, the same assignments, and the same assessments with little variation or modification from student to student. Personalized learning may also be called student-centered learning, since the general goal is to make individual learning needs the primary consideration in important educational and instructional decisions, rather than what might be preferred, more convenient, or logistically easier for teachers and schools. The idea of personalization is widely applied in e-learning.

It has to be stated at the very beginning that personalized learning is not a return to student-centered theories, and it is not about separating students/learners to learn on their own. The rationale for personalized learning is to raise standards by focusing teaching and learning on the aptitudes and interests of learners.

Personalised learning typically has five key components that all must understand to enable learners to engage actively in the management and design of their own learning:

1. Learning how to learn: helping learners develop a repertoire of learning skills and strategies to support their development as self-directed learners
2. Assessment for learning: using a range of assessment techniques, with the emphasis on formative assessment that engages the learner.
3. Teaching and learning strategies: deploying the full repertoire of strategies, with learner and teacher making informed decisions about which to use and when.
4. Curriculum choice: providing learners with guided opportunities to develop individual learning pathways that develop skills rather than knowledge.
5. Mentoring and support: ensuring that learners have a one-to-one mentoring relationship with an adult, and that they benefit from peer support.

### **ICT as support of personalized learning**

The advancement of information and communication technologies (ICTs) and digital content development tools made personalized learning available to wider audiences. There are several advantages of ICT in learning as stated in [61]:

- ICT can present content in an engaging and attractive form
- ICTs help teachers to record and constantly monitor the progress of each student
- ICTs allow customized delivery of relevant education material to each individual learner.
- ICTs can build virtual social communities among different educational institutions, teams of students or teachers.
- ICTs facilitate learning-to-learn skills.

ICT enables the implementation of the abovementioned components of personalized learning as follows:

- For assessment of learning: Assessment in a classic educational institution is usually limited to examinations at the end of a learning unit. It is usually accompanied by grading and its primary goal is to compare students' achievements with standards. More detailed assessment of students' needs, abilities and progress has been too difficult to perform. Advances in the

various learning management systems (LMS) made an automated assessment occurring throughout the learning process a reality. The complete data on students' progress including multiple-choice tests results, portfolios, works in progress, results of one-to-one conversations, etc. can be collected at the desired rate. Teachers can use this information to make data-driven decisions regarding the adjustment of instruction of each individual student.

- For effective teaching and learning: Even the best teachers have to use the universal teaching strategies to deliver course material to students in the traditional classroom. Thus, the 'one size fits all' approach is a main measure to keep classes going. Information technologies make personalized instruction possible through the adjustment of learning strategies and content to each individual student. This approach has become highly popular in e-Learning, but it can also be implemented in the classroom, when selective delivery of digital content becomes a part of personalized instruction.
- For curriculum personalization: Students within a group in the typical classroom environment have to follow the same learning program at a pace that allows even poor achievers to master the material. This undermines the progress of talented students. With the use of computers and mobile devices not only learning paths, but also curricula can be personalized for every student. Each person in the classroom can be presented with the material he or she needs. A learning management system will keep track of the advancements of every student in the class, ensuring that the core material will be covered by everyone, but also giving the best achievers an opportunity for in-depth intensive teaching.
- For changing the organization of educational institutions: The emergence of information technologies hasn't changed educational institutions as such. In most of them, computers are still primarily used as tools for teaching information technologies and don't change the way students learn other subjects. When used for personalized teaching and learning, computers and mobile devices transform the respective processes and also change the organization of educational institutions. The classroom layout is redesigned to reflect the shift of attention from the teacher to students. Instead of typical rows of tables, classroom setup can be organized in such a way that students – equipped with individual computers or tablets – will be facing each other and the teacher. Class schedule changes and corresponding resource allocation adjustment due to the necessity to provide a wider curriculum choice can be mediated through LMS.
- To take education beyond the classroom: In a world without information technologies, the involvement of students, community enthusiasts and industry professionals in the education process requires their physical

presence in the classroom. Nowadays, learning content can be produced by experts in digital form and then used repeatedly for teaching students. Using Web 2.0 tools and social networks, learners can interact with each other beyond the classroom. Their progress can be monitored online. Mobile devices and Internet connection allow students to continue their studies in a familiar learning environment wherever they are.

Some educators believe that personalized learning could diminish the relational and ethical dimensions of education. To avoid this, personalization should not be taken to the extremes, when it becomes similar to self-learning. The teacher using personalized learning in the classroom should combine it with other teaching techniques (teaching in small groups, mentoring, etc.).

### **Personalized learning, tailored learning and lifelong learning**

Personalised learning recognises that learners begin their learning experience from different starting points and that they possess unique talents, aptitudes and skills that have not been previously recognised or used to best effect to overcome barriers to learning. It acknowledges that learners need to learn how to learn and to access different opportunities and support to succeed in adult life. [60]

Within the personalized learning teachers work with individual learners to assess the learner's previous achievements and experiences (personal, social and educational), needs, interests and aspirations. They then map out what the learners need to do and achieve to get where they want to be. The recommended steps for learners to take are identified and targets are set and agreed so that they have the best chance of achieving their future goals. Review dates are recorded and methods of support planned for in a document that is often called an individual learning plan. This plan is, in effect, a route map for lifelong learning.

Based on [62] to make these plans happen, learners have to be empowered which means that they are:

- Involved in compiling schemes of work, planning and delivering sessions, planning and delivering group tutorials, mentoring their peers, planning and developing a programme of enrichment activities. Learners' participation in the above activities supports the concept of personalised learning. It also helps to foster within learners a greater awareness of their actions and consequences, contributions and rewards.
- Informed: about: the assessment criteria for the qualifications being studied; methods of support and where it can be obtained; progress made to date; steps that need to be taken to achieve long-term goals; progression

opportunities and the day-to-day operations of their schools. If learners are informed, they are in a better position to make choices that give them the best chance of success.

- Heard: the schools and teachers should obtain and act on learners' views. Tutorials and feedback are important here.

### **Conclusion**

Within this module we paid attention to the idea of personalization of education and personalized learning and the five typical key components of personalized learning. We also explained how ICT can be used for support of the personalized learning in its different parts and phases. We had a closer look at the relations among personalized learning and lifelong learning.



## 4. Further reading

- [http://dysgu.cymru.gov.uk/docs/learningwales/publications/121122ictlearninge\\_n.pdf](http://dysgu.cymru.gov.uk/docs/learningwales/publications/121122ictlearninge_n.pdf) - pdf file named "Does ICT improve learning and teaching in schools?" contains general overview of the impact of ICT on teaching and learning in a broader educational research context.
- <http://www.openeducationeuropa.eu/sites/default/files/asset/creative%20learning%20Punie.pdf> – pdf where authors argue for the necessity of creativity and innovation in educational sets. It focuses on three interrelated enablers for change: technologies, culture and pedagogy.
- <http://www.unevoc.unesco.org/fileadmin/up/emergingtrendsinctforeducationandtraining.pdf> - pdf file concerning on description of education paradigms shifts, creation of new culture, pedagogical practices using ICT and emerging topics in ICT integration
- <http://ftp.jrc.es/EURdoc/JRC62370.pdf> - pdf file report of a project on 'Creativity and Innovation in Education and Training in the EU27 (ICEAC)' The project aimed to provide a better understanding of how innovation and creativity are framed in the national and/or regional education objectives and applied in educational practice at primary and secondary school level. It collected and analysed the present state of affairs in the Member States as regards the role of creativity and innovation in primary and secondary schools.
- <http://www.nsead.org/ict/links/links51.aspx> contains a list of websites contain further information to support the ICT in Schools strategy.
- European Project i-LAB2 – Innovation Laboratories for the quality assurance of vocational education and training - <http://www.ilab2.eu>
- Center for Creative Learning - <http://www.creativelearning.com/>
- Bobby Elliott (2007) Modernising assessment: the use of web 2.0 for formative and summative assessment.
- Pyka A., Koppers P. (2002) – Innovation Networks Theory and Practice. Edward Elgar Publishing
- Buell, C. (undated). Cognitivism. Retrieved 10 June, 2015 from <http://web.cocc.edu/cbuell/theories/cognitivism.htm>.
- OpenInn Project: Innovative didactics:
- <http://openinn.eu/learning-material/pedagogical-background/2-innovative-didactics/25-focus-adult-education-innovative-didactics-framework> (retrieved on 27 June 2015)
- Effective Adult Learning: A Toolkit for Teaching Adults (2012) nwcphp, University of Washington

- More on brainwriting: [http://www.mbabrief.com/what\\_is\\_brainwriting.asp](http://www.mbabrief.com/what_is_brainwriting.asp), and <http://www.creativityatwork.com/2011/01/10/brainwriting/>
- More on group facilitation: <http://ctb.ku.edu/en/table-of-contents/leadership/group-facilitation/group-discussions/main>
- <http://www.mindtools.com/pages/article/RoleofAFacilitator.htm>
- Solution Surfers – Solution focused coaching <http://www.solutionsurfers.com/>
- European Project i-LAB2 – Innovation Laboratories for the quality assurance of vocational education and training - <http://www.ilab2.eu>
- Center for Creative Learning - <http://www.creativelearning.com/>
- Bobby Elliott (2007) *Modernising assessment: the use of web 2.0 for formative and summative assessment*.
- Pyka A., Koppers P. (2002) – Innovation Networks Theory and Practice. Edward Elgar Publishing
- <http://manualthinking.com/tag/osborn-checklist/>
- <http://www.wired.com/2014/01/artificial-intelligence-set-deliver-wow/>
- ]How to manage collective creativity, video by Harvard professor Linda Hill, co-author of "Collective Genius", available at [https://www.ted.com/talks/linda\\_hill\\_how\\_to\\_manage\\_for\\_collective\\_creativity](https://www.ted.com/talks/linda_hill_how_to_manage_for_collective_creativity)
- Alla Zusman, Overview of Creative Methods available at [http://www.ideationtriz.com/paper\\_Overview\\_of\\_Creative\\_Methods.asp](http://www.ideationtriz.com/paper_Overview_of_Creative_Methods.asp)
- Udacity <https://www.udacity.com/>
- Coursera <http://coursera.org/>
- Edx <https://www.edx.org/>
- M4T <http://moodle4teachers.org/>
- EMMA <http://project.europeanmoocs.eu/>
- Alison <http://alison.com/>
- W3Schools <http://www.w3schools.com/>
- Neuronal Dynamics <http://neurondynamics.epfl.ch/>

## 5. References

- [1] G. Gast: NSEAD: ICT, on-line. Available at:  
<http://www.nsead.org/ict/about/about12.aspx>, Accessed 25 March 2015
- [2] Practical ideas for teaching in digitally rich environments, on-line. Available at:  
<http://education.qld.gov.au/smartclassrooms>, Accessed 20 February 2015
- [3] Ch. Ley: The Partnership Development Schools (PDS) Strategy Phase 3, 2008-09, on-line. Available at: <http://education.exeter.ac.uk/pspitt/5%20Cross-Curricular%20Literacy,%20Numeracy%20&%20ICT/Using%20ICT%20to%20Enhance%20Learning.doc>, Accessed 1 March 2015
- [4] R. Cachia, A. Ferrari, K. Ala-Mutka and Y. Punie: Creative Learning and Innovative Teaching; Final Report on the Study on Creativity and Innovation in Education in the EU Member States, 2010
- [5] H. Kim, H. Choi, J. Han & H.-J. So: Enhancing teachers' ICT capacity for the 21st century learning environment: Three cases of teacher education in Korea. In C. P. Lim & C. S. Chai (Eds), Building the ICT capacity of the next generation of teachers in Asia. Australasian Journal of Educational Technology, 28 (Special issue, 6), 2012, p. 965-982
- [6] S. Majumdar: Emerging Trends in ICT for Education & Training, on-line. Available at:  
<http://www.unevoc.unesco.org/fileadmin/up/emergingtrendsiniictforeducationandtraining.pdf>, Accessed 20 February 2015
- [7] W. Orora, F. N. Keraro and S. W. Wachanga: Using cooperative e-learning teaching strategy to enhance students' creativity in secondary school biology: a study of selected schools in nakuru county, kenya. In International Journal of Education and Practice, 2014, 2(6): 137-146
- [8] S. Saxena: How Can Technology Enhance Student Creativity? on-line. Available at: <http://edtechreview.in/trends-insights/insights/750-how-can-technology-enhance-student-creativity>, Accessed 12 January 2015
- [9] Z.T. Zhu: On Educational Informatization and the transforms of educational cultures, in Journal of Global Chinese Society of Computers in Education, Vol.1., 2003
- [10] K. Ala-Mutka, et al: ICT for Learning, Innovation and Creativity. on-line. Available at: <http://ftp.jrc.es/EURdoc/JRC48707.TN.pdf>, Accessed 06 March 2015
- [11] Dorota Koprowska, (2014), *Innovation Laboratory – Good Practice Guide*. Radom: Institute for Sustainable Technologies – National Research Institute. p. 95.
- [12] Australian Institute for Commercialisation and Queensland Department of Employment, Economic Development and Innovation, (2009), *Innovation Toolbox Evaluate Idea*. Queensland. p. 13

- [13] Adams Karlyn. (2005) *The sources of Innovation and Creativity*. Washington: National Centre on Education and the Economy. p. 59
- [14] Wagner Philipp, Dr Piller Frank (2012). *Increasing innovative capacity: is your company ready to benefit from open innovation processes?* Aachen: RWTH Aachen University. p. 10
- [15] <http://www.merriam-webster.com/dictionary/innovative>)
- [16] [http://edutechwiki.unige.ch/en/Learning\\_theory](http://edutechwiki.unige.ch/en/Learning_theory)
- [17] George, Siemens: *Connectivism: A Learning Theory for the Digital Age*, <http://www.elearnspace.org/Articles/connectivism.htm> (Connectivism: A Learning Theory for the Digital Age.)
- [18] *George Siemens (September 12, 2009) What is connectivism?*, [https://docs.google.com/document/d/14pKVP0\\_ILdPty6MGMJW8eQVEY1zibZ0RpQ2C0cePlgc/edit](https://docs.google.com/document/d/14pKVP0_ILdPty6MGMJW8eQVEY1zibZ0RpQ2C0cePlgc/edit)
- [19] European Project OpenInn 2.0: A Knowledge Generating House and e-Assessment Model <http://openinn.eu/> for virtual company: <http://openinn.eu/learning-material/pedagogical-background/2-innovative-didactics/26-virtual-company-model>
- [20] European Project OpenInn 2.0: A Knowledge Generating House and e-Assessment Model <http://openinn.eu/> for virtual company: <http://openinn.eu/learning-material/pedagogical-background/2-innovative-didactics/26-virtual-company-model>
- [21] Grabowska A.: "Model of DE system in LAN and WAN", Ph.D. thesis, Gdansk University of Technology, Faculty of Electronics Telecommunications, (2001).
- [22] Kłosowski P., Grabowska A.: "Obsługa programu AutoCAD 2000 i 2002 w ćwiczeniach", MIKOM , Warszawa, (2002).
- [23] Obsługa programu AutoCAD 2000 i 2002 w ćwiczeniach online, 25.05.2015, <http://blanka.moodle.pl/file.php/1/index.html>
- [24] Autodesk Authorised Training Centre at Gdansk University of Technology, <http://acsa.pg.gda.pl/>
- [25] Grabowska A.: "Lifelong Learning and Blended Learning based on TeleCAD and Moodle LMS – Case Studies", EduAkcja. Magazyn edukacji elektronicznej, nr 1 (7)/2014, pp. 15–22, 25.05.2015, <http://wyrwidab.come.uw.edu.pl/joomla2/files/pdf/64.pdf>
- [26] Autodesk evaluation system, 25.05.2015, <http://atcevaluation.autodesk.com/Authentication.aspx>
- [27] ATVN-EU-GP Open Contest of "Best Practice Projects" (2005), 25.05.2015, <http://www.atvn-eu-gp.pl/contest/winners.htm>
- [28] TVP1 (2004), 25.05.2015, [http://utwpg.gda.pl/ATC/teledcad\\_short.avi](http://utwpg.gda.pl/ATC/teledcad_short.avi)
- [29] Links to publications online, 25.05.2015:
- <http://www.sefi.be/wp-content/papers2003/sefi-f79.pdf>

- [http://www.kti.ue.poznan.pl/conferences/i3e/papers/Anna\\_Grabowska.pdf](http://www.kti.ue.poznan.pl/conferences/i3e/papers/Anna_Grabowska.pdf)
  - <http://www.atvn-eu-gp.pl/conferen/resource/p/proj-02/telecad/telecad.pdf>
  - [http://link.springer.com/chapter/10.1007%2F1-4020-8162-6\\_23#page-1](http://link.springer.com/chapter/10.1007%2F1-4020-8162-6_23#page-1)
- [30] Wikipedia, [http://en.wikipedia.org/wiki/Massive\\_open\\_online\\_course](http://en.wikipedia.org/wiki/Massive_open_online_course),
- [31] Institutional MOOC strategies in Europe, Status report based on a mapping survey conducted in October - December 2014, EADTU, February 2015, [http://www.eadtu.eu/documents/Publications/OEenM/Institutional\\_MOOC\\_strategies\\_in\\_Europe.pdf](http://www.eadtu.eu/documents/Publications/OEenM/Institutional_MOOC_strategies_in_Europe.pdf)
- [32] MOOCs and Open Education Around the World, edited by Curtis J. Bonk, Mimi M. Lee, Thomas C. Reeves, Thomas H. Reynolds, MOOCs and Open Education Around the World Paperback – March 17, 2015, <http://openworldbooks.com/moocs-book.php>
- [33] CLASS CENTRAL, <https://www.class-central.com/report/ten-most-popular-moocs-october-2015/>
- [34] MIT OPENCOURSEWARE, <http://ocw.mit.edu/index.htm>
- [35] <http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/>
- [36] UNESCO OPEN EDUCATIONAL RESOURCE PLATFORM, <http://www.oerplatform.org/>
- [37] WSIS Community Platform, <http://www.wsis-community.org/pg/groups/14358/open-educational-resources-oer/>
- [38] WSIS Global List of OER Initiatives, <http://www.wsis-community.org/pg/directory/view/672996>
- [39] UNESCO Open Learning Platform, <http://otp.unesco-ci.org/>
- [40] The William and Flora Hewlett Foundation, <http://www.hewlett.org/search/?x=0&y=0&keywords=OER>
- [41] Giving Knowledge for Free, OECD, <http://www.oecd.org/edu/cei/38654317.pdf>
- [42] [https://wikieducator.org/Main\\_Page](https://wikieducator.org/Main_Page)
- [43] WikiEducator, <https://open4us.org/>
- [44] W3Schools.com, <http://www.w3schools.com/>
- [45] Wulfram Gerstner, Werner M. Kistler, Richard Naud and Liam Paninski, Neuronal Dynamics, From single neurons to networks and models of cognition, <http://neurondynamics.epfl.ch/>
- [46] European Project OpenInn 2.0: A Knowledge Generating House and e-Assessment Model <http://openinn.eu/> for virtual company: <http://openinn.eu/learning-material/pedagogical-background/2-innovative-didactics/26-virtual-company-model>

- [47] European Project OpenInn 2.0: A Knowledge Generating House and e-Assessment Model <http://openinn.eu/> for virtual company: <http://openinn.eu/learning-material/pedagogical-background/2-innovative-didactics/26-virtual-company-model>
- [48] Wagner Philipp, Dr Piller Frank (2012). *Increasing innovative capacity: is your company ready to benefit from open innovation processes?* Aachen: RWTH Aachen University. p. 10
- [49] Australian Institute for Commercialisation and Queensland Department of Employment, Economic Development and Innovation, (2009), *Innovation Toolbox Evaluate Idea*. Queensland. p. 13
- [50] Adams Karlyn. (2005) *The sources of Innovation and Creativity*. Washington: National Centre on Education and the Economy. p. 59
- [51] <http://literarydevices.net/self-fulfilling-prophecy/>
- [52] <http://www.enchantedmind.com/html/creativity/techniques/techniques.html>
- [53] <http://www.microsoft.com/en-us/education/training-and-events/education-competencies/creativity.aspx#fbid=TnLrM9CJDj2>
- [54] <http://www.cs.umd.edu/hcil/CST/Papers/creativitysupport.htm>
- [54] Bryan W. Mattimore: *Idea Stormers: How to Lead and Inspire Creative Breakthroughs* Hardcover– September 19, 2012
- [56] Higgins, J.M. (1996), "Innovate or evaporate: creative techniques for strategists", *Long Range Planning*, Vol. 29, No. 3, pp. 370-380.
- [58] Osborne, A.F. (1963), *Applied Imagination: Principles and Procedures of Creative Thinking*, 3rd ed., Scribner, New York.
- [59] <http://www.britannica.com/EBchecked/topic/444145/Helen-Parkhurst>
- [60] [http://en.wikipedia.org/wiki/Personalized\\_learning](http://en.wikipedia.org/wiki/Personalized_learning)
- [61] <http://iite.unesco.org/pics/publications/en/files/3214716.pdf>
- [62] <http://www.drcheryljones.com/publications/Personalised%20Learning%20-%20Learner%20Empowerment.pdf>
- [63] [http://sebokwiki.org/wiki/Enterprise\\_Capability\\_Management](http://sebokwiki.org/wiki/Enterprise_Capability_Management)
- [64] Comparative Analysis of Methods of Identification of Skill Needs on the Labour Market in Transition to the Low Carbon Economy, International Labour Organization, [http://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/---ifp\\_skills/documents/publication/wcms\\_166824.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166824.pdf)

[65] ESOMAR web site <https://www.esomar.org/knowledge-and-standards/codes-and-guidelines.php>

[66] Eurostat web site <http://ec.europa.eu/eurostat>

[67] Łuczak J., Matuszak-Flejszman A.: Metody i techniki zarządzania jakością. Kompendium wiedzy, Quality Progress, Poznań 2007.

[68] Huber Z.: Metodologia 5-Why, <http://www.strefa-iso.pl/5-why.html>

[69] Zasadzień Z., Radomski D.: Porównanie wybranych narzędzi służących badaniu niezgodności wyrobów, [w:] Koncepcje zarządzania jakością, doświadczenia i perspektywy, [red.] T. Sikora, wydawnictwo uniwersytetu Ekonomicznego, Kraków 2008

## 6. GLOSSARY

**Active listening:** a communication technique used in counselling, training and conflict resolution, which requires the listeners to give feedback to the speaker on what they hear, by way of re-stating or paraphrasing in their own words what they have heard, to confirm it, and moreover, to confirm the understanding of both parties.

**Adult education:** a practice in which adults engage in systematic and sustained self-educating activities in order to gain new forms of knowledge, skills, attitudes, or values. It can mean any form of learning adults engage in beyond traditional schooling, encompassing basic literacy to personal fulfilment as a lifelong learning.

**Affinity group:** a group formed around a shared interest or common goal, to which individuals formally or informally belong. Affinity groups are generally precluded from being under the aegis of any governmental agency, and their purposes must be primarily non-commercial.

**AI (artificial intelligence) models of creativity:** deals with solving non-quantified, unstructured problems. Its task is about knowledge representation and reasoning and to build intelligent, rational, and autonomous agents.

**Assessment:** in education refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students.

**Audio:** transmission, reception and reproduction of sound.

**AutoCAD:** a commercial software application for 2D and 3D computer-aided design (CAD) and drafting — available since 1982 as a desktop application and since 2010 as a mobile web- and cloud-based app marketed as AutoCAD 360.

**Behaviourism:** in education focuses on one particular view of learning: a change in external behaviour achieved through using reinforcement and repetition to shape behaviour.

**Beneficiary:** in the broadest sense is a natural person or other legal entity who receives money or other benefits from a benefactor.

**Blended Learning:** a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, path, or pace. In blended



learning approach the face-to-face classroom methods are combined with computer-mediated activities.

**Brainstorming:** process for generating creative ideas and solutions through intensive and freewheeling group discussion. Every participant is encouraged to think aloud and suggest as many ideas as possible, no matter seemingly how outlandish or bizarre. Analysis, discussion, or criticism of the aired ideas is allowed only when the brainstorming session is over and the evaluation session begins.

**Brainwriting:** a technique similar to Brainstorming. There are many varieties, but the general process is that all ideas are recorded by the individual who thought of them. They are then passed on to the next person who uses them as a trigger for their own ideas.

**Career path:** the way that you progress in your work, either in one job or in a series of jobs.

**Certification:** refers to the confirmation of certain characteristics of an object, person, or organization. This confirmation is often, but not always, provided by some form of external review, education, assessment, or audit.

**Challenging:** encourage clients to take responsibility and to be accountable, validate client understanding, perception and commitment to plans, and hold clients to account for progress and follow through.

**Cluster:** a number of things growing fastened or occurring close together, or a number of persons or things grouped together.

**Cognitivism:** the psychology of learning which emphasizes human cognition or intelligence as a special endowment enabling man to form hypotheses and develop intellectually. (Cognitivism) is also known as cognitive development.

**Commercialization:** to offer something for sale, or make something available for sale. It also includes a move from the laboratory into commerce.

**Constructivism:** based on the belief that learning occurs when learners are actively involved in a process of meaning and knowledge construction as opposed to passively receiving information. Learners are the makers of meaning and knowledge.

**Collaborative learning:** a situation in which two or more people learn or attempt to learn something together. Unlike in the case of individual learning, people engaged in collaborative learning capitalize on one another's resources and skills

(asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.).

**Community of practice:** a group of people who share a craft and/or a profession. It can evolve naturally because of the members' common interest in a particular domain or area, or it can be created specifically with the goal of gaining knowledge related to their field.

**Connectivism:** a hypothesis of learning which emphasizes the role of social and cultural context.

**Cost effective:** economical in terms of the goods or services received for the money spent.

**Creativity:** a phenomenon whereby something new and somehow valuable is formed. The created item may be intangible (such as an idea, a scientific theory, a musical composition or a joke) or an original physical object (such as an invention, a literary work or a painting).

**Creativity mindset:** to be highly creative you first need the right creative mindset. Having the outlook, attitude and beliefs that empower and support you to be as creative as you can. Without this, creativity will be compromised and limited. Living in a creative state of mind or with a creativity mindset means having the ability to live in a way that allows you to think, feel and act with deep personal freedom, purpose and values. Being creative allows embodying joy and authenticity, forming goals and objectives in life. How people feel about creativity effects how they feel about everything in life. The creative mindset sets the stage for your professional success as well as your life purpose.

**Creative Thinking:** specific thought processes which improve the ability to be creative. Being in an optimal state of mind for generating new ideas. To think deliberately in ways that improve the likelihood of new thoughts occurring. To maximize the ability of the brain to think of new ideas. The ability to think of original, diverse and elaborate ideas. A series of mental actions which produce changes and developments of thought. The process of exploring multiple avenues of actions or thoughts. Sometimes called divergent thinking because thought patterns and areas of belief are expanded.

**Creativity techniques:** methods that encourage creative actions, whether in the arts or sciences. They focus on a variety of aspects of creativity, including techniques for idea generation and divergent thinking, methods of re-framing problems, changes in the affective environment and so on. They can be used as parts of problem solving, artistic expression, or therapy. Some techniques require groups of two or more people while other techniques can be

accomplished alone. These methods include word games, written exercises and different types of improvisation, or algorithms for approaching problems.

**Curiosity:** The desire to learn or know more about something or someone; inquisitiveness

**Demand:** a buyer's willingness and ability to pay a price for a specific quantity of a good or service. Demand refers to how much (quantity) of a product or service is desired by buyers at various prices.

**Distance Education:** a generic term used to define the field of distance learning which is a mode of delivering education and instruction, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom.

**Distance Learning:** a mode of delivering education and instruction, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom. Distance learning provides access to learning when the source of information and the learners are separated by time and distance, or both.

**e-learning:** the delivery of a learning, training or education programme by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material.

**Engagement:** take time to build rapport with clients, invite clients to review and reflect on the previous action plan, help clients to define their requirements, discuss client expectations of the coaching to be delivered.

**ESOMAR -**

**World Association of Opinion and Marketing Research Professionals:** an organisation for encouraging, advancing and elevating market research worldwide.

**Eurostat:** the statistical office of the European Union situated in Luxembourg. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions.

**Evaluation:** a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards.

**Expertise:** special skill or knowledge; the skill or knowledge an expert has.

**Facilitator:** involves helping individuals and groups explore a range of issues and challenges through the use of a variety of tools and techniques.

**Flexibility:** an ability to cope with changes in circumstances and think about problems and tasks in novel, creative ways.

**Focus group:** a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a product, service, concept, advertisement, idea, or packaging.

**Formal education:** normally delivered by trained teachers in a systematic intentional way within a school, academy/college/institute or university.

**Graphics:** visual images or designs on some surface, such as a wall, canvas, screen, paper, or stone to inform, illustrate, or entertain.

**Group tutorials:** something that provides special, often individual instruction, especially: a book or class that provides instruction in a particular area; a program that provides instruction for the use of a system or of software.

**HR management:** Human Resource Management is primarily concerned with the management of people within organizations, focusing on policies and on systems. HR departments and units in organizations typically undertake a number of activities, including employee benefits design employee recruitment, "training and development", performance appraisal, and rewarding (e.g., managing pay and benefit systems).

**ICT (Information and Communication Technologies):** refers to technologies that provide access to information through telecommunications. It focuses primarily on communication technologies which include the Internet, wireless networks, cell phones, and other communication mediums.

**iLab2:** European Lifelong Learning project with its major objective being the improvement of the quality of vocational education and training through the use of i-Labs (innovation laboratories) in the didactic processes.

**Images:** one of the many types of media that can take form as photos, drawings, logos or graphs.

**Informal education:** a general term for education outside of a standard school setting

**Innovation:** a new idea, more effective device or process.

**Innovation Management:** the concept encompasses an integrated approach to managing all dimensions of innovation, from innovation in products, services and business processes to organisational and business models, through continuous monitoring, development and improvement processes.

**Intellectual Property Rights:** a term referring to creations of the intellect for which a monopoly is assigned to designated owners by law.

**International Labour Organization:** an United Nations agency that is dealing with labour issues, particularly international labour standards, social protection, and work opportunities for all.

**Knowingness:** possessing knowledge, information, or understanding e.g. very knowing about creativity importance. Showing clever awareness and resourcefulness; shrewd and worldly.

**Learning experience:** refers to any interaction, course, program, or other experience in which learning takes place, whether it occurs in traditional academic settings (schools, classrooms) or non-traditional settings (outside-of-school locations, outdoor environments), or whether it includes traditional educational interactions (students learning from teachers and professors) or non-traditional interactions (students learning through games and interactive software applications).

**Learning Management System:** a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs.

**Learning outcome:** the specification of what a student should learn as the result of a period of specified and supported study. Learning outcomes are concerned with the achievements of the learner rather than the intentions of the teacher (expressed in the aims of a module or course). They can take many forms and can be broad or narrow in nature.

**Learning theory:** conceptual frameworks describing how information is absorbed, processed, and retained during learning

**Learning-to-learn skills:** ability to pursue and persist in learning to organise one's own learning, eg. through effective management of time and information, both individually and in groups. This competence includes awareness of one's learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully. This competence means gaining, processing and assimilating new knowledge and skills as well as seeking and making use of guidance. Learning to learn engages learners to build on prior

learning and life experiences in order to use and apply knowledge and skills in a variety of contexts: at home, at work, in education and training. Motivation and confidence are crucial to an individual's competence.

**Lead-user:** users of a product or service that currently experience needs still unknown to the public and who also benefit greatly if they obtain a solution to these needs. Because lead users innovate, they are considered to be one example or type of the creative consumer's phenomenon, that is, those customers who adapt, modify, or transform a proprietary offering.

**Leonardo da Vinci programme:** a sub-programme within Lifelong Learning Programme funded practical projects in the field of vocational education and training.

**Lifelong Learning:** the ongoing, voluntary, and self-motivated pursuit of knowledge for either personal or professional reasons. It enhances social inclusion, active citizenship, and personal development, self-sustainability, competitiveness and employability.

**Living Lab:** a research concept, a user-centred, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership. The concept is based on a systematic user co-creation approach integrating research and innovation processes. These are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases.

**Mind mapping:** a diagram used to visually organize information. A mind map is often created around a single concept, drawn as an image in the centre of a blank landscape page, to which associated representations of ideas such as images, words and parts of words are added. Major ideas are connected directly to the central concept, and other ideas branch out from those.

**Moodle:** a free and open-source software learning management system written in PHP and distributed under the GNU General Public License, developed on pedagogical principles. Moodle is used for blended learning, distance education, flipped classroom and other e-learning projects in schools, universities, workplaces and other sectors.

**Motivation:** internal and external factors that stimulate desire and energy in people to be continually interested and committed to a job, role or subject, or to make an effort to attain a goal.

**Networking:** the process of exchanging information, resources, mutual support and opportunities thanks to mutual contacts.

**Non-formal education:** organized (even if it is only loosely organized) form of education, which is not part of formal education, but may or may not be guided by a formal curriculum.

**OECD:** Organization for Economic Co-operation and Development

**Online Course:** web-based, designed to engage and stimulate the learner, and are not simply a collection of resources. They provide great flexibility; give an opportunity to learn at your own pace, in your own space.

**Open Educational Resources:** freely accessible, openly licensed documents and media those are useful for teaching, learning, and assessing as well as for research purposes.

**Open License:** a free, copy left license for software and other kinds of works.

**Open Source Software:** a computer software with its source code made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose. Open-source software may be developed in a collaborative public manner.

**Osborn's Checklist:** a simple tool to support concept generation, Osborn's checklist is a comprehensive list of questions about ideas and problems, which can be used either individually or in groups.

**Out of the box thinking:** a metaphor that means to think differently, unconventionally, or from a new perspective. This phrase often refers to novel or creative thinking.

**Peer evaluation:** a process whereby students or their peers grade assignments or tests based on a teacher's benchmarks. The practice is employed to save teachers time and improve students' understanding of course materials as well as improve their metacognitive skills.

**Personal Learning Environments:** systems that help learners take control of and manage their own learning. This includes providing support for learners to: set their own learning goals (with support of their teachers), manage their learning, both content and process, communicate with others in the process of learning.

**Portfolio:** a type of briefcase and it refers to a collection of things depending on the term that is following. Examples are asset portfolio, career portfolio, electronic portfolio etc.

**Self-assessment:** continuing process through which managers at all levels evaluates the effectiveness of their performance in all areas of responsibility, and determine what improvements are required.

**Service Provider:** a company that provides organizations with consulting, legal, real estate, education, communications, storage, processing, and many other services.

**Skill:** the learned ability to carry out a task with pre-determined results often within a given amount of time, energy, or both.

**Small and medium-sized enterprises (SMEs):** businesses whose personnel numbers and either turnover or balance sheet total fall below certain limits. The criteria for defining the size of a business differ from country to country and in EU they are defined in the EU recommendation 2003/361.

**Stakeholder:** a person, group or organization that has interest or concern in an organization who can affect or be affected by the organisation actions, objectives and policies.

**State of the Art:** the level of development (as of a device, procedure, process, technique, or science) reached at any particular time usually as a result of modern methods at a particular time.

**Strong point:** something at which one excels; forte.

**Student-centred learning:** refers to a wide variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students. To accomplish this goal, schools, teachers, guidance counsellors, and other educational specialists may employ a wide variety of educational methods, from modifying assignments and instructional strategies in the classroom to entirely redesigning the ways in which students are grouped and taught in a school.

**Technical viability:** refers to the products or service that will be offered. Will the product do what it is supposed to do?

**Toolkit:** a set of tools designed to be used together or for a particular purpose.

**Training Curriculum:** a total package of learning activities designed to achieve the objectives of the training program. It consists of three primary components



which are the content or information to be transmitted, the organization of the curriculum and the training methods used.

**Tutorial:** an article „step by step", the publication allows users to easily learn how to use software, programming or creating graphics. This term is also computer programs or presentations of performing such functions.

**UNESCO:** United Nations Educational, Scientific and Cultural Organization.

**UNE 166000:2006** (standard): a Spanish series of standards for innovation management.

**Video:** electronic technology based on a sequence of images that can be recorded, processed, transmitted and reproduced giving the illusion of movement.

**Virtual community:** a community of people sharing common interests, ideas, and feelings over the Internet or other collaborative networks.

**Visioning:** encourage clients to explore their beliefs and feelings about the subject of the coaching, help clients to develop a clear understanding of what they want to achieve. Help clients to envisage and to define what success looks like. Encourage clients to explain why it is important they are successful and support clients to define clear goals and objectives. Help clients to identify potential resources they can use to achieve success and identify potential barriers and risks to achieving success and to help clients to explore options for overcoming any barriers.

**Vocational education and training:** Generally known as **career and technical education** (CTE) or **technical and vocational education and training** (TVET) it prepares people for specific trades, crafts and careers at various levels from a trade, a craft, technician, or a high professional practitioner position in careers such as accountancy, nursing, etc. Craft vocations are usually based on manual or practical activities and are traditionally non-academic but related to a specific trade, occupation. It is sometimes referred to as *technical education* as the trainee directly develops expertise in a particular group of techniques. Vocational education can be at the secondary, post-secondary level, further education, and higher education level.

**Weak point:** an attribute that is inadequate or deficient; an imperfection of character.

**WEB 2.0:** the term given to describe a second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online. It refers to the transition from static HTML Web pages to a more dynamic Web that is more organized and is based on serving Web applications to users while also including open communication with an emphasis on Web-based communities of users, and more open sharing of information.

**WikiEducator:** an international online community project for the collaborative development of learning materials, which educators are free to reuse, adapt and share without restriction. WikiEducator was launched in 2006 and is supported by the non-profit Open Education Resource (OER) Foundation.

**Workplace:** the physical location where someone works. Such a place can range from a home-office to a large office building or factory.

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