A Distributed Concurrent Design based e-Learning approach to Entrepreneurship Education

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This paper describes the design of an intensive e-Learning course for Entrepreneurship Education, aiming to young ICT professionals willing to turn innovative ideas into a business. During the course, entitled "*FLITE Innovation and Entrepreneurship*", the aim is to choose an innovative idea and turn it into a business plan for forming a startup company. Towards this goal students are using a methodology called *ConCurrent Design* (*CCD*) process and specific tools for personal and business development, namely *Osterwalder Canvas Model YOU* and *Osterwalder Model Generation*. They are trained, in the early stages of the course, in the use of the above process and tools. Special emphasis is given on an effective combination of self-directed learning based on well prepared, well-structured courseware material and networked learning collaborative work in small groups (4-6 members/group). In the context of the group, which takes the form of a Personal Learning Network (PLN), they discuss and choose an innovative idea (also early during course delivery), which acts as the basis for their entrepreneurship learning process and the relevant Business Model and Business plan development. The paper also describes preliminary evaluation results of a pilot delivery of the course. The course was designed and delivered in the context of the EU/Life Long Learning Centralized funded project "*dCCDFLITE - distributed Concurrent Design Framework for eLearning in IT Entrepreneurship*" (*FLITE* for short).

Keywords

Entrepreneurship Education, Concurrent Design Methodology, Computer Supported Collaborative Learning, Personal Learning Networks, Self-Directed Learning

1. Introduction

During the last years it is well recognized that promoting Entrepreneurship in Higher and Vocational Education is of key importance to encourage more entrepreneurial attitude towards innovation and business development. The European Commission with the announced *Entrepreneurship 2020 Action Plan* [1] aims to enhance Europe's entrepreneurial potential, to remove existing obstacles and to revolutionise the culture of entrepreneurship in Europe, giving emphasis on three main pillars: *(a) Entrepreneurial education and training, (b) Creation*

of an environment where entrepreneurs can flourish and grow, and (c) Developing role models and reaching out to specific groups whose entrepreneurial potential is not being tapped to its fullest extent [2].

This paper describes the design of an intensive e-Learning course for Entrepreneurship Education, aiming to young ICT professionals willing to turn innovative ideas into a business. The course brings together Higher Education (HE) Information Technology (IT) students or fresh graduates, Vocational Trainees with young ICT professionals having a strong will to turn innovative ideas into a business. During the course students are trained to apply a *distributed ConCurrent Design (dCCD)* methodology together with tools for personal and business development. Special emphasis is given on an effective combination of self-directed learning based on well prepared, well-structured courseware material and networked learning collaborative work in small groups (4-6 members/group). In the context of the group, which takes the form of a Personal Learning Network (PLN), they discuss and choose an innovative idea (during the first stage of course delivery), which acts as the basis for their entrepreneurship learning process and the relevant Business Model and Business plan development.

In the next paragraph we discuss all the important issues which were considered for developing the ‰nnovation and Entrepreneurship+course, including aims and objectives, the course target group and methodology used. In paragraph 3 we present the Concurrent Design Methodology which plays a central role in our case. Paragraph 3 concerns the course delivery scenario, pedagogy issues of the course as well as evaluation results of a first pilot run of the course with a selected group of students. Conclusions and future work are discussed in the last paragraph of the paper.

2. Course Design Issues

Distance learning, on-line learning, and e-learning, nowadays, are considered similar terms having in common the fact that they provide a learning environment at a distance. A critical issue in such environments is that they require distance learners to be self-motivated and self-disciplined. In such occasions the more learner centered is the course the more successful we expect it to be [3], [4], [5]. There were many designing issues and choices that had to be made during the specific course development. The issues taken into consideration are strongly related to the profile of the students target group, to the domain subject of the course and they are both of technological and pedagogical nature:

Our starting point in developing the course was its target group: The main aim of the training developed was to promote cross-sectoral and cross-cultural collaboration on entrepreneurial knowledge transfer, on the domain of Information and Communication Technology (ICT), between Higher Education graduates and industry employees. This reflects on the one hand on an increasing need to work at a distance (remote working) experienced in many IT businesses in Europe (especially SMEs and Start-Up companies) and on the other hand on the need of young ICT graduates or fresh employees in building the entrepreneurial knowledge they lack, since business administration, marketing and finance issues where not among their first degree curriculum. Learners of such a target group are not seeking on acquiring a deep knowledge on entrepreneurship per se but they tend to focus on building knowledge and skills in an intensive way, explicitly in preparation for operating or starting a business company. In this respect their training should be *domain specific,* in the sense that we have to apply a

methodology that could guide students to act as entrepreneurs from the very beginning of the delivery of the course and grog this way of acting in their learning. The self-directed learning approach and computer supported collaborative learning are key issues and should be incorporated in the course structure in an appropriate combination.
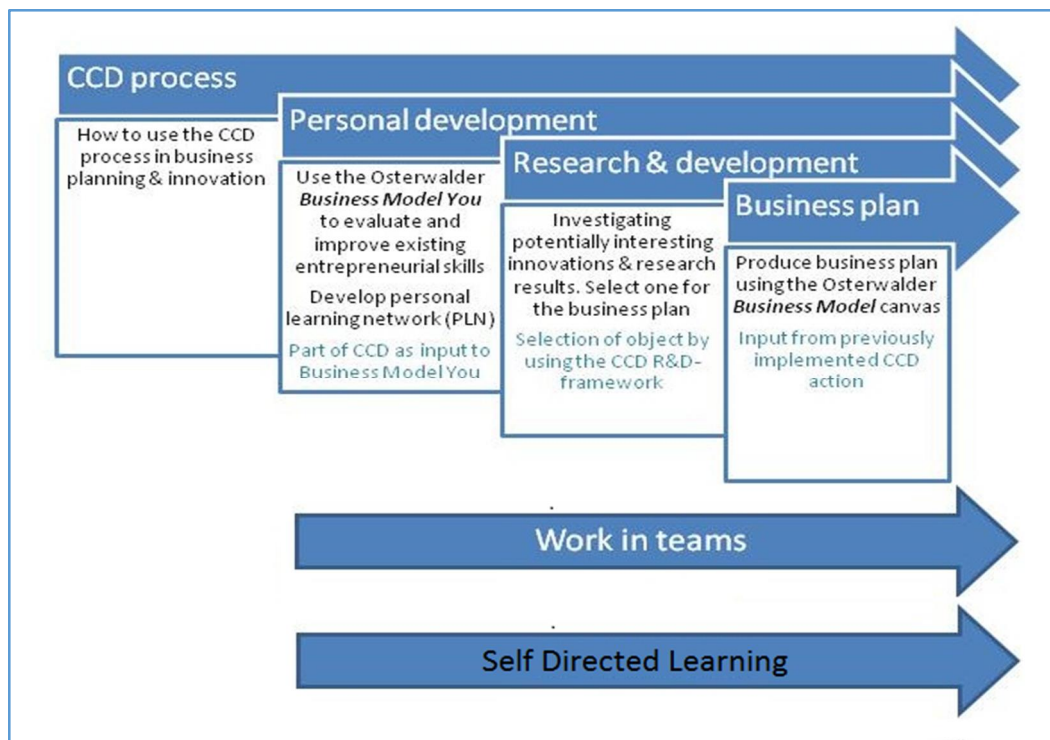
Figure 1: Learning scenario for course development

Self Directed Learning (SDL) is an instruction method where students are considered self-motivated and take responsibility for their own learning [6]. It can be defined in terms of the degree of responsibility the students accept during course delivery for their own learning. They are able to define and investigate topics of their own choice and pace and they reflect on their past experience and their newly developed knowledge. Gerald Grow [7] in his Staged Self-Directed Learning (SSDL) model defines four stages of self-direction. Students belonging to the higher (fourth) level are able to "*exercise skills in time management, project management, goal-setting, self-evaluation, peer critique, information gathering, and use of educational resources*". In our case during the initial phase of the course students have guidance from the tutors and gradually become more independent and self-directed.

Computer Supported Collaborative Learning (CSCL), nowadays also termed simply as *Networked Learning*, denotes a paradigm shift in open learning where computer technology and networks are used to facilitate new forms of instruction that are not only learner-centered but are also strongly based on collaborative approaches [8]. CSCL encourages collaboration among the students, so that they are not simply reacting in isolation to uploaded e-learning material but their learning process is accomplished through interactions among them. Students learn by expressing their questions, pursuing lines of inquiry together, helping each other and sharing knowledge [9]. In our case students, in order to collaborate, are expected to participate in small groups in the form of Personal Learning Networks (PLN). Early in the course students are advised to suggest possible innovative ideas, which can be used as a basis for forming

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start-up companies. Group formation is then based on a common innovative idea choice and the target of the group becomes to evolve this idea into a business model and a business plan for the formation of the start-up company.

Figure 1 depicts the learning scenario upon which the course development was based. To facilitate both collaborative learning and self-directed learning during course delivery we have adapted a *Concurrent Design (CCD) process* methodology [10] together with Osterwalder Canvas tools [11] for personal and business plan development. This amalgamation of the CCD methodology with the specific tools has the additional goal of "injecting" entrepreneurial thinking to the students.

Based on the above the aim of the course is that by its end, students:

- are trained to use an appropriate methodology for writing a business model, using distributed collaboration.
- are trained to create a business model, using the Osterwalder Business Model Canvas.
- know ways to identify and analyze entrepreneurial opportunities.
- are able to define value propositions, market segmentation, strategic alliances.
- are able to collaborate with key people in order to deal with the appropriate processes and procedures for writing a business plan and be able to start the process of launching a new company

The course developed consists of the following modules:

Introduction: An all in one introduction to the course, process methods and tools for distance collaborating and business plan development.
CCD - Concurrent Design: Process methodology and tools for online collaboration, towards the implementation of a business model.
Osterwalder Business Model Canvas: Tools for personal development and designing a business model.
Entrepreneurship: Material on different aspects of entrepreneurship and innovation, and business modelling.
*Presentation of group work on the business model.*

3. Concurrent Design Methodology and Tools

Concurrent design is closely related to concurrent engineering, a methodology which has been applied successfully in the past, for product development and manufacturing. It is based on the idea that several tasks regarding user requirements, quality and cost as well as tasks of design and manufacturing engineering should be performed concurrently in order minimize the elapsed time required to bring a new product to the market. More formally Concurrent Engineering is defined in [12] as "*a systematic approach to integrated product development that emphasises the response to customer expectations. It embodies team values of co-operation, trust and sharing in such a manner that decision making is by consensus, involving all perspectives in parallel, from the beginning of the product life-cycle*". Concurrent Design evolved as a general methodology to obtain effective multidisciplinary problem solving where time and costs can be saved while we are able to deliver products of better quality.
The basic premise for applying concurrent design revolves around three concepts: People, Process and Tools [13]. The desired results of the design (or problem to be solved) are

achieved by means of a process, the right people and utilisation of appropriate tools for solving the problem. This is known as the PPT model (figure 3):

- *People*: Different experts representing their respective fields and having the authority to make decisions within the field they represent are collaborating for the design process.
- *Process*: The process typically describes what to do and when different events should happen. A very important part of this process is the implementation of a number of concurrent working sessions during the design process. The role of these sessions, which are realized as intensive and interdisciplinary synchronous collaboration videoconference meetings, is for decision making and future planning.
- *Tools*: Different experts will typically use specific tools (expert tools), but some general tools to support the interaction between participants are also required. These could be project administrative tools such as action lists, decision lists, or project planning tools. Additionally web tools for supporting the synchronous meetings as well as computer supported collaborative work tools for supporting the work between sessions meetings should be used.
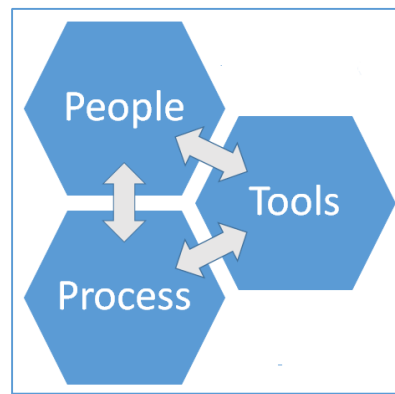
Figure 2: The PPT model

Recently Concurrent Designed Methodology was adapted as a model to the area of e-learning course development, involving specialists in instructional design (pedagogy), knowledge (content) and technical delivery [13], [14], [15]. The adapted methodology is termed *distributed Concurrent e-learning Design* (*dCCD*), emphasising the fact that an e-learning course could be developed and delivered in a distributed way.

For the needs of the current e-learning course on Innovation and Entrepreneurship we have customized the dCCD methodology amalgamating it with tools for personal development and business modeling. We have selected Osterwalder Business Canvas which provides the appropriate means both for personal and business modeling. Osterwalder Business Canvas is based on the Business Model Ontology developed by Alexander Osterwalder [16] and it can be regarded both as a methodology and as a graphical modeling tool. %Osterwalder Business Model You+(BMY) is a tool to examine ones entrepreneurial skills and personal network [17]. One can get more insight into what his/her abilities are and how a personal entrepreneurial networking could be structured. Additionally Osterwalder Business Model Generation is an appropriate tool for group collaboration with the aim of developing a business model [18]. The business model is defined as consisting of the following nine (9) building blocks that constitute the business model canvas:

- The value proposition of what is offered to the market
- The segment(s) of clients that are addressed by the value proposition
- The communication and distribution channels to reach clients

- The relationships established with clients.
- The key resources needed to make the business model possible.
- The key activities necessary to implement the business model.
- The key partners and their motivations to participate in the business model.
- The revenue streams generated by the business model.
- The cost structure resulting from the business model.

The dCCD methodology is used to stimulate collaboration among the students taking the course in order to produce a business model based on the nine building blocks of canvas model. As mentioned above students belonging to a group have chosen an innovative idea and their goal is to collaborate towards the development of a business plan for forming a relevant start-up company. Following the process of the suggested dCCD methodology students are expected to become able to work in a structured way toward the development of a business model and produce a business plan

The process is guided by five organized working sessions (figure 3), where students are meeting in a virtual conference room to discuss progress of their work. The aim is to speed up the development process by having students acting as subject area experts (based on their previous knowledge and experience) and working in parallel and consulting each others work when there is a need for, clarifications or decisions. The five working sessions are:
- Session-1: What is the situation with regard to the suggested business idea?
- Session-2: What possibilities exist?
- Session-3: Selection of solutions
- Session-4: How the solutions should be designed and modeled?
- Final Session: Completion of the business model/writing of the business plan.
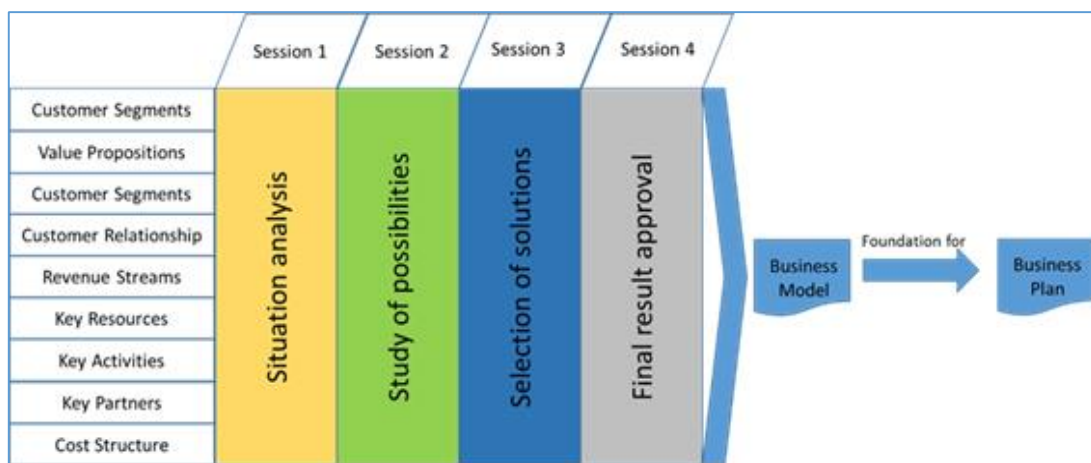
Figure 3: Suggested working sessions for the Entrepreneurship dCCD process

In between sessions students are working either self-directed or collaborating with members of the group studding relevant course material, seeking tutoring help or addressing issues regarding the progress of their business planning. Having as a milestone the next working session they have to prepare themselves accordingly for their participation, in order to present assigned work by the group, be able to express their opinions for all relevant issues and take decisions. For better coordination and collaboration it is important that students of the group preserve and update in a cloud-based document repository a decision list and an activity list as well as any other document they consider pertinent.

4. Pilot Course Delivery

After its development the course was delivered in a small number of students. The purpose of the small pilot was to test the course on a scale small enough to allow for in-depth evaluation of the processes at work. Eleven students were selected by the partners of the FLITE project having the characteristics of the target group (cross-sectoral and cross-cultural). They were final year ICT students, ICT fresh graduates, self-employed in their new personal start-up business and unemployed. Their origin was from Greece, Norway, Portugal, Sweden and UK.

The course was intensive, offered over a period of 8 study weeks, and its workload corresponded to a minimum of 50 hours of study. These hours are not ment to be equally distributed and how much work students actually had to invest, depends in part on their previous knowledge on the subject.

In our case the pearsonopenclass Learning Management System (LMS) played the role of the backbone platform for all course activities including the support of the dCCD process (see figure 4).
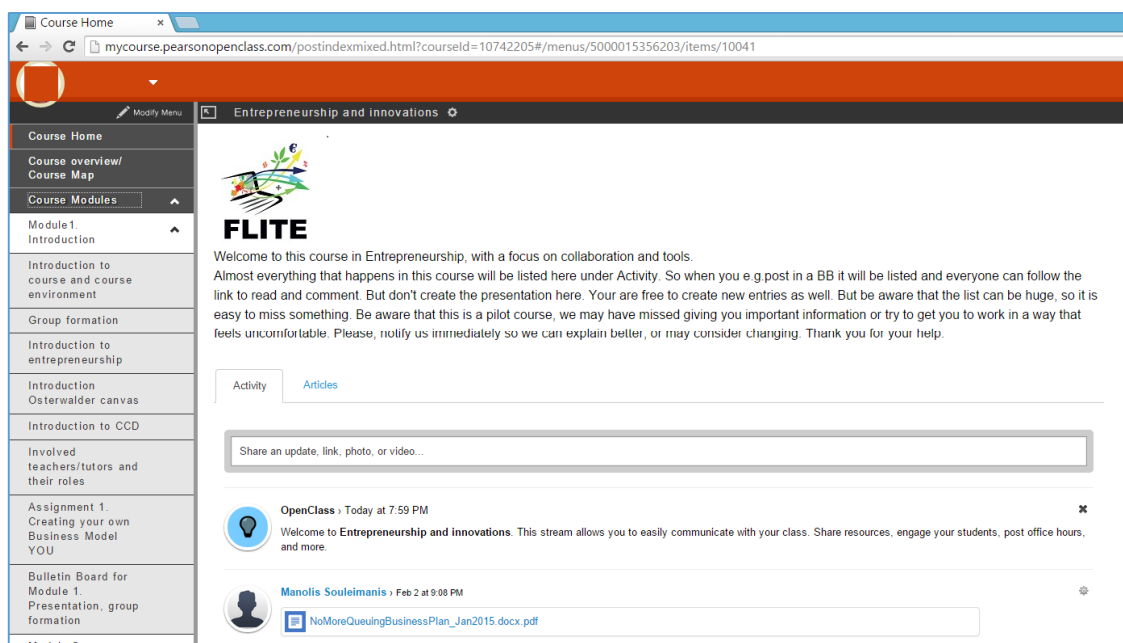

Figure 4 Extract from the FLITE welcome page of pearsonopenclass LMS

Before the start of the course students received an extensive document with course aims and objectives and with all necessary guidelines regarding their LMS account, how to use the LMS, as well as the additional tools needed during course delivery. They also received information on the cloud-based document repository to be used for collaborative writing. During the start of the course a videoconference meeting was organized for all students and tutors explained to them the structure and content of the course as well as the importance of selecting an innovative business idea to base their group formation and their process for entrepreneurial learning. Adobe Connect was used as a virtual videoconference room and google drive for documents repository. Additionally a timeline scenario was presented to the students as a possible way for following course activities. This timeline is provided through the LMS under the entry "Course Map" (upper left corner in figure 4) in the form of a "zoom in . zoom out" Mind Map which describes things to do and deliverables as the course progresses. A snapshot

representing a partial view of the Mind Map is given in figure 5. It was noted that the week based timeline is just a suggested scenario and students are able to adapt it according to their needs, based on their knowledge and responsibilities assigned to them in the context of the group they will be working.

During week one students had to present themselves together with their thoughts on their possible future entrepreneurial intentions. They were also asked to suggest possible innovative business ideas. By the end of week one an additional videoconference meeting was organized for all students as an introductory training session on the dCCD methodology and the Osterwalder Business Canvas framework.
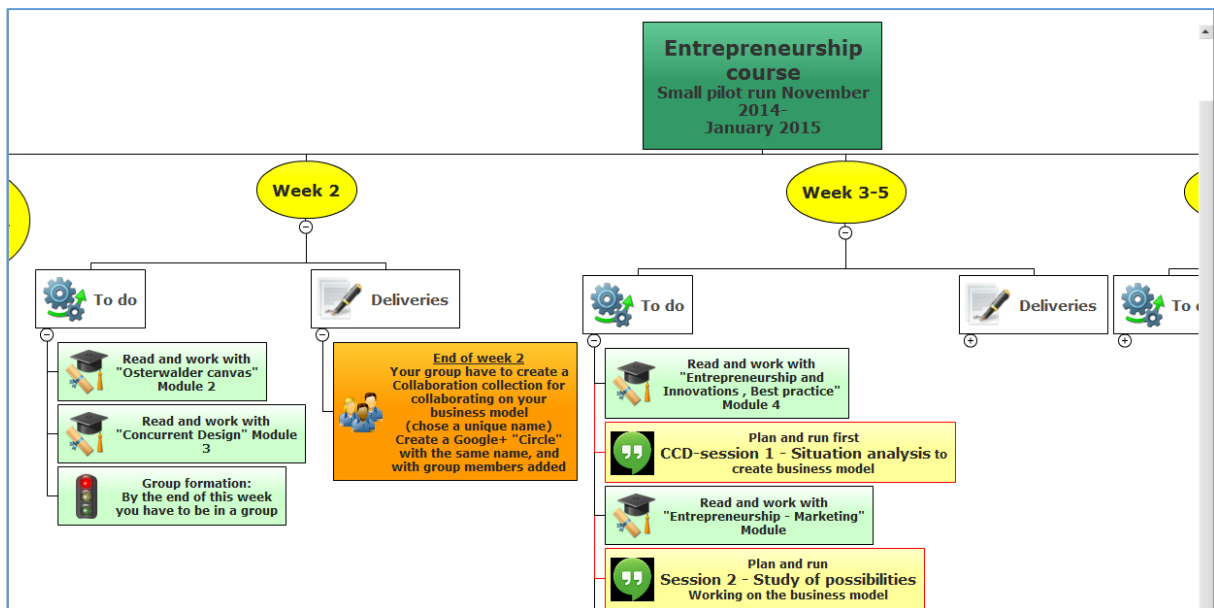
Figure 5 A snapshot of the Mind Map process used in the FLITE course

During week two students followed a voting procedure to choose between business ideas (there were four suggestions) and based on their decisions they formed two groups in order to start their collaboration towards business modelling. During a third videoconference meeting students were advised in the context of their group to:
- Discuss the «business idea» the group will be working on
- Create a new directory in google drive for their group named with their business idea to act as a working space for asynchronous collaboration and collaborative editing of documents
- Discuss every members competence in the group
- Go thru the theory modules: CCD, Osterwalder, Entrepreneurship, possibly splitting the work between them for the entrepreneurship subtopics
- Decide who will be the main responsible to act as a group facilitator for the working sessions (Google Hangout was suggested as an example tool to support real time synchronous session meetings.)
- Set dates and times in their group for the dCCD working sessions
- Divide the main responsibility on the 9 Osterwalder topics in the group if they find it appropriate
- To preserve an activity list and a decision list in their working space in coordinate their activities

- Make sure to hold focus on the overall session activity in each session (situation analysis, study of possibilities et.c.)
- After each session plan and agree on «homework activities»

In the following weeks students had to go throw the steps suggested by the dCCD process. There were no more synchronous meetings with tutor participation. Tutoring was accomplish only asynchronously with tutors playing the role of observer of the process, giving advice and answering questions when needed. A weekly based message was sent to the students to remind them thinks to do and including remarks and suggestions regarding their activities.

At the end of the course one of the groups presented their business model and the business plan document. Members of the other group dropout the course after week three.

Upon the completion of the course a summative evaluation procedure was followed through the use of questionnaires, one for the students and one for the tutors/partners of the project The studentsqquestionnaire examined the following issues:
- User Motivation and Previous Knowledge
- User Experience regarding course delivery
- Course Content
- Working in Groups/ dCCD process
- Tutor Support
- Entrepreneurial Awareness

The tutors/partners questionnaire concentrated on the following:
- Course aims and objectives
- Course Content
- Course Platform
- Course Pedagogy and Timeline

Based on a preliminary processing of the questionnaires the following conclusions are in order:
- In general students, having completed the course, feel that they have gained a very good knowledge on the topic and the process they followed during the course raised their entrepreneurial awareness. All but one would recommend the course to others.
- Regarding student motivation and previous knowledge it became obvious that those having stared their own company or aiming to develop one in the near future are the ones to complete the course and develop a business plan. Students who actually joined the course with the aim of gaining general knowledge on entrepreneurship have found the course either tedious or somehow confusing and this was the main reason for dropping out of the course before its completion.
- Regarding the 5 suggested working sessions of the dCCD process students found difficulties in completing all of them, so they have rearranged them to three. They also mentioned that they would feel more comfortable if the facilitator of the group was a course tutor and not one of them.
- Regarding aims and objectives of the course both students and project partners responded that although clear at the general level they need to be specialized and be present to each separate module of the course.
- Regarding contents/topics of course modules they are coherent with aims and objectives of the course, but a more clear distinction is needed between domain content (entrepreneurship and innovation) and suggested processes (dCCD and Osterwalder Canvas).

- The LMS course platform online platform (LMS) is easy and intuitive to use and easy to navigate but the indirect connection to Google Drive was somehow confusing. It was more straightforward to use google drive separately.
- The Mind Map concept used as a timeline for course process and procedures received very positive comments.

5. Conclusions and future work

In this paper we presented an entrepreneurship course addressed in non-business and professional discipline, such as Information and Communication technology. The course is intended to fell the knowledge gap and raise entrepreneurial awareness to ICT people coming both from Higher Education (HE) and from the ICT industry sector. An important issue of the course, which was delivered at a small pilot phase, was that students were considered self-motivated and they were asked to base their learning process on an innovative business idea that they had to choose and suggest a business plan for transforming this idea to a start-up business. During the course they were trained to apply a *distributed ConCurrent Design (dCCD)* methodology together with tools for personal and business development. This methodology gives special emphasis on an effective combination of self-directed learning based on courseware material and networked learning collaborative work in small groups. Evaluation results of the small pilot showed that the course methodology applied is considered successful and in line with course aims and objectives, but reveal issues that need to be improved and some problems to be solved. Among these problems was that half of the students drop out of the course before its completion. Although the students for the small pilot were recruited carefully by the project partners it proved that our e-learning course suffers from the same problem regarding drop-out rates reported in the relevant literature [19], [20].

The results of the small pilot course evaluation will be used for amendments and transformations in order to improve the course which will be tested in a second large-scale pilot. The purpose of the large-scale pilot will be to test the updated version of the course on a scale large enough to evaluate its practical implementation in the future. It was decided that the course will be offered through the Canvas Network (www.canvas.net) as a MOOC type of course. The second pilot will recruit on an open basis and should result in larger more viable learner groups. Groups will be self-organised as much as possible based on their business ideas and following a set of criteria e.g. there must be at least one HE and one industry learner, the should be from different countries in each team. It is not possible to follow the course without being a group member, since the whole idea of the course is strongly based on group collaboration. Learning goals and objectives, methodology and tools to be used duration and workload of the course while be the same as in the small pilot.

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