ALEXANDRU IOAN CUZA UNIVERSITY OF IAȘI

FACULTY OF PSYCHOLOGY AND EDUCATION SCIENCES

THE SUMMARY OF THE THESIS

FOSTERING COLLABORATIVE LEARNING IN VIRTUAL ENVIRONMENTS.

CURRICULUM DEVELOPMENT

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Instead of a "Contents" section

The research area covered in this thesis is new and not enough explored in Romania. First of all, the new technologies were adopted in many fields of interest only in the last two decades. Secondly, the first steps in formalizing the compulsoriness of training in using ICT coincide with the integration of Romania within the European Union. The final aim of this thesis is to suggest a model for curriculum development in order to support collaborative learning in the virtual environment. This model aims at training teachers in the field of using information and communication technologies (ICT) in education but it can also be adopted in other educational contexts as well.

The aim of the thesis

From an interdisciplinary perspective, by combining the field of the new technologies and that of educational sciences, the thesis states that the training in the field of the new technologies can be made by using collaborative learning in virtual environment as didactic strategy. This is possible because in virtual environment learning can be extended beyond the space and time limits of a formal course.

The perspective of the thesis

After we aimed at detecting the trends at the level of educational policies concerning training in using ICT, by using an inductive mixed approach which supposed using qualitative and quantitative research methods, we have organised three interdependent studies. In the first study, we made an inventory of the knowledge and abilities in using ICT necessary for a student. In the second study we aimed to find out the conditions under which collaborative learning takes place in the virtual environment and in the third study we aimed to check the utility level of four colaborative technologies used during four seminars

Methodology

Study 1

Study 2

Study 3

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organised throughout during the first semester of the academic year 2011-2012.

Results
The results indicate that beyond the knowledge and abilities of using the computer as an instrument, the greatest challenges for a student in the field of the new technologies are the adaptation to the information flow in the online environment as well as finding the relevant and useful information. The possibility to access the organized information by the members of a learning team, the permanent communication and the access to the results of learning are aspects which influence collaboration and have been appreciated by the participants in the second study. Moreover, the use of some colaborative technologies over a longer period of time in order to solve some working tasks, had positive results at the level of interaction and collaboration within the teams especially formed for this.

A curriculum development model
By corroborating the data obtained in our investigative approach with the overall image of the teacher training in using ICT in Romania, at the end of this thesis we proposed a model of curriculum development and made a series of recommendations which can be taken into account at the level of the academic educational institutions in the context of using ICT in education.

Keywords: teachers' training, new technologies, collaborative learning, curriculum development

Introduction

Generally, the new technologies have been associated with something unprecedented, but we consider it is important to highlight that although many aspects of people's activities have been improved due to technology, the functioning or organizing principles have remained the same. In order to be more specific, we offer the example of education: the traditional teaching and learning methods are still used, but the new technologies enrich them (Ally, 2004; Kozma 2001; van Dam, Becker and Simpson, 2005). In this direction, some authors point out that the teaching environment or the technology do not influence the results of learning to the extent the strategies and methods inserted with technology in the contents do (Ally, 2004; Rovai, 2002; Schramm, 1977).

The didactic methods and the new technologies

Drawing a parallel between the ways of introducing the new technologies (Văideanu, 1988) and the insertion of technology in education, we can say that the latter has been integrated through infusion method (*approche infusionnelle*). This method has imposed and still imposes adjustment processes and changes at the level of didactic methodology, of the management of learning groups and contents.

This supposes that teachers will pass from **"knowing how to use technology"** to **"integrating technology in the didactic activity"**, so that all software and hardware change into a simple instrument, in a process. Forming these competences means that teachers attend initial training programs in the field of information and communication technologies (ICT), programmes with an integrated character: for each of the studied disciplines, they should use a variety of applications and acquire strategies to

Training in the field of using new technologies in education

Integrated character

insert and use technologies with a view to solving some working tasks typical of their discipline. Moreover, the initial training should represent a basis for continuous training aiming to help teachers in making connections between the emerging technologies and the reference frameworks concerning digital competences or the contents to be taught. The initial training should also bring changes in the educational processes with the help of technology. (Moersch, 1995).

Conditions for adjusting to a society based on knowledge

Acquiring some abilities like that of using the computer or other new communication instruments, of using software applications installed on a computer or of using interactive systems are important conditions for adapting to a knowledge based society and are part of a set of key competences for those who live this society (UNESCO, 2008).

In Romania, acquiring ICT competences is compulsory for the entire secondary education. From our point of view this aspect is very important because in spite of the fact that today's youth – also called digital natives (Prensky, 2001) – are using technology easily, this does not mean that that they can also use it efficiently for learning (Logofătu, 2003; Pegrum, 2011; Rockman, 2004).

Contexts for using the curriculum development model suggested in the thesis

Based on the results obtained during our investigative approach, on our acquired experience and also on the literature review in the field of the new technologies and their use in education, we aimed to suggest a curriculum development model which can be adopted within at least two contexts:

- teachers' training programmes in the field of ICT and or other disciplines;
- creating a curriculum for the didactic master program.

The Theoretical Framework of the Thesis

Being an interdisciplinary thesis, its theoretical content reflects both the socio-economical context and the educational one, contexts in which our research has been carried out. Through the concepts definitions at the beginning of each chapter and through the practical examples useful in education, presented along with our own opinion concerning their applicability, the methodological approach of our research is grounded. In this way, the readers receive a series of information that can accompany them in reading, without being confused by the technical terms they might find at the end of the thesis.

The theoretical framework is comprised of three chapters, each of them covering areas such as:

The theoretical contents

- Information and communication technologies in education (Chapter 1);
- Digital literacy (Chapter 2);
- Collaborative learning and the premises of curriculum development in the field of training in using ICT (Chapter 3).

Chapter 1 is focusing on concepts we used throughout the thesis. As we mentioned above, besides the concepts definitions (ICT, e-learning, open source software), the chapter comprises a detailed description of the context where the thesis is situated: the level of technological development and its influence in education, new trends and results of adopting technology in education (educational software, blended learning, virtual mobility, web 2.0).

Chapter 1: ICT in education

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Fostering Collaborative Learning in Virtual Environments. Curriculum Development

The Theoretical Framework of the Thesis

Chapter 2: Digital literacy

The second chapter approaches the issue of digital literacy which is "the ability to appropriately use digital technology, communication tools, and/or networks to solve information problems in order to function in an information society. This includes having the ability to use technology as a tool to research, organize, and communicate information and having a fundamental understanding of the ethical/legal issues surrounding accessing and using information." (Katz, 2007, p.4).

Definition

Programmes of initial and continuous training in using ICT-support for digital literacy

The presentation of the way teachers' initial training in using ICT is carried out at the level of three European countries – Romania, Ireland and Great Britain – represents the completion from a pragmatic point of view of the section dedicated to digital literacy. This is also the case with the sections meant for describing alternatives for continuous training in the field of using ICT (ECDL/ICDL, Intel Teach etc.) focusing on the competences and knowledge a digitally literate person should have.

Chapter 3: Collaborative learning and the premises of curriculum development in using ICT training

The third chapter describes the theoretical basis of our approach – that of social constructivism – by arguing why collaborative learning is useful in the context of new technologies usage: once the transition from static web technologies to dynamic web technologies made – web 2.0 (O'Reilly, 2005) – the social dimension becomes more important in the virtual environment, offering to any user the ability to disseminate or to acquire information, "building" it accordingly to one's own style and rhythm of learning.

The role of collaborative learning in training

Being given the differences between the abilities of using ICT of today's generations of users (Prensky, 2001), collaborative learning supported by the web 2.0 technologies could successfully go beyond the sessions of initial and continuous training in the field of using ICT.

The sections dedicated to collaborative learning, methods of monitoring and evaluating this type of learning, as well as to the curriculum development in the field of ICT training focusing

more on the collaborative experiences, do not represent only a theoretical description. These sections represent the result obtained after the sedimentation of the information found in the specialized publications as well as in our studies. Thus, beyond the analysis of the socio-economical and educational contexts also reflected in the theoretical framework of the thesis, this chapter is supporting the argumentation of the suggestions regarding the importance of collaborative learning in the virtual environment. It contains the description of practical approaches in implementing curriculum development models in training in using ICT.

Curriculum development models

Moreover, the description of some applications and online platforms which support collaborative learning (Facebook, Iversity, Google Docs and Wikispaces) is representing a preliminary part in presenting our research, taking into account that we have used these platforms and tools in our studies.

Instruments supporting collaborative learning

Research and results

The next two chapters of the thesis are dedicated to the presentation of our research initiated during the doctoral study program, and to the description of a curriculum development model.

Chapter 4: Curriculum development in information technology for achieving collaborative learning. Practical applications

The fourth chapter of the present thesis describes three interrelated studies conducted in Ireland and Romania which coincides with what curriculum development specialists called "action" and "observation" prior to reflection and planning of a curriculum development model.

The mixed type inductive approach (combining qualitative and quantitative methods) involved first of all the accomplishment of a thorough investigative approach based on the literature review and on the process of enacting ICT policies regarding education in Romania, Ireland and the United Kingdom (UK). Based on the information and the results obtained from this first investigative approach, with a group of eleven experts we made an inventory of the knowledge and skills that students – the users of the new technologies – should have in order to optimize learning process.

Based on the results of this inventory we conducted a second study in which we planned to find out what enhances collaborative learning in the virtual environments and continued with an assessment of the usability of four collaborative technologies (listed at the end of the previous section). All these have been carried out in order to recommend them as platforms that can be used in conducting seminars or courses using the complementary perspective of blended learning.
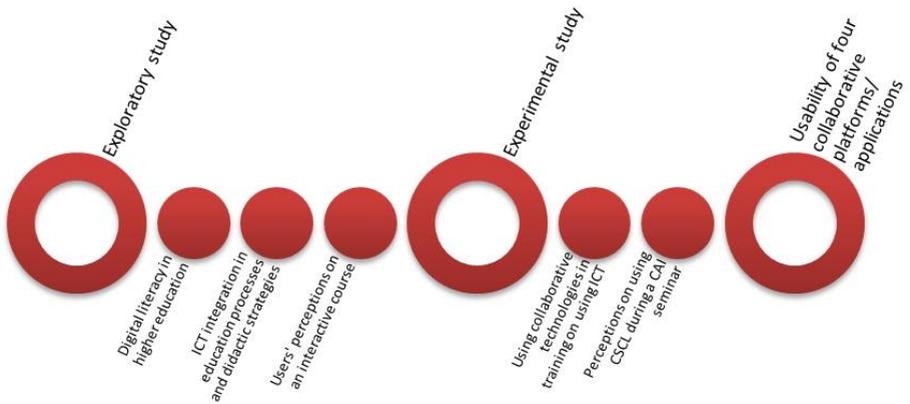
Figure 1. Research design

The first study was focused on two directions: digital literacy in higher education and didactical strategies implying the use of ICT in teacher training.

Table 1. Methodology – study 1

Participants	**11 specialists** from the international academic medium **28 primary and secondary school teachers** from Ireland
Research methods	semi-structured interview Content analysis of online discussions
Tools used for data collection and interpretation	interview guide *NVivo*
Period	June-September 2011 (in Ireland)

The analysis of the interviews made with the experts shows that the five most important types of skills and knowledge considered to be the basis for a digital literate are the following: using

communication software, editing and formatting text, using e-mail, surfing and using efficient the Internet and social networks.

Recommended knowledge

In terms of technology or knowledge recommended for the future digital literate student, the first five types mentioned by experts are: understanding the operating principles of technology, effective use of social networks, search and use the online information, use of ubiquitous technologies.

The most frequently used technologies during education processes

In order to optimize the training and assessment processes using ICT, specialists were frequently mentioning the use of **e-learning platforms**, **videos** and **wiki technologies**. If we focus on a hierarchy of technologies which are useful for teamwork and its monitoring, the experts highlight again e-learning platforms, wiki technologies and **online forums**. In addition, examples have been given regarding the training based on the use of **virtual worlds** (*e.g.* Second Life) and **cloud technologies**.

The 28 teachers evaluated the interface design, the content quality and the methods used in an interactive online course. These values are summarized below:

Assessment concerning an interactive online course

- Course interface: intuitive, without graphics load but which can cause problems associated with the signing-up, simple menus and directions given for the a proper navigation through the course modules, search facilities;
- Content: clear, accompanied by interactive graphics as was the case, useful for the knowledge based society (the use of computer and its peripherals and the Internet);
- Methods: the opportunity to practice in order to improve skills, the existence of a demonstration component, feedback received after solving each task.

The second study is an exercise meant to implement the results of the first study analysis and the conclusions drawn from literature review regarding collaborative learning supported by computers. The main objective was to determine those conditions where collaborative learning appears in a virtual environment.

Study 2 (mixed approach)

Methodology

Table 2. Methodology – Study 2

Participants	**144 students** from the Faculty of Letters, UAIC (experimental group – **EG**) **17 students** from the Faculty of Orthodox Theology, UAIC (control group – CG)
Research methods	Action research Experimental Study
Tools used for data collection and interpretation	1. Team Fitness Test-TFT (Bendaly, 1997) 2. Questionnaire regarding the quality of the seminar Computer Assisted Instruction (CAT) 3. Team Activity Reports in CG 4. Wikispaces 5. Google Analytics 6. SPSS
Period	October 2011 – January 2012 CAI seminar held in the first semester, UAIC

Results

The results confirmed our hypotheses and tip the balance towards the usefulness of collaborative learning technologies.

Differences between EG and CG regarding the evaluation of team-work

H1 – the level of appreciation regarding the teamwork of the participants who solved common tasks using ICT differs from the participants who have used ICT to a lesser extent to solve the same task – **hypothesis confirmed**

ICT is influencing team work

H2 – The use of ICT in order to solve the team tasks influences the manifestation of the teamwork abilities – **hypothesis confirmed**

Team cohesion

H3 – The use of collaborative technologies in order to solve the team tasks influences the manifestation of the team cohesion – **hypothesis confirmed**

Correlation between cohesion and final result

H4 – There is a correlation between a learning team's cohesion degree and its final result obtained after solving a task by using ICT predominantly – **hypothesis confirmed**

Correlation between online activity and its final results

H5 – There is a correlation between online activities of a working team supported by the collaborative technologies and the team's final results – **hypothesis partially confirmed**

ICT and social presence

H6 – The collaborative technologies and peers' social presence facilitate the adaptation process in using ICT – **hypothesis confirmed**

Positive assessment concerning collaborative learning

H7 – The frequency of the students' positive appreciations regarding the learning supported by collaborative technologies as a teaching strategy within the CAI seminar, is higher than the frequency of the negative appreciations – **hypothesis confirmed**
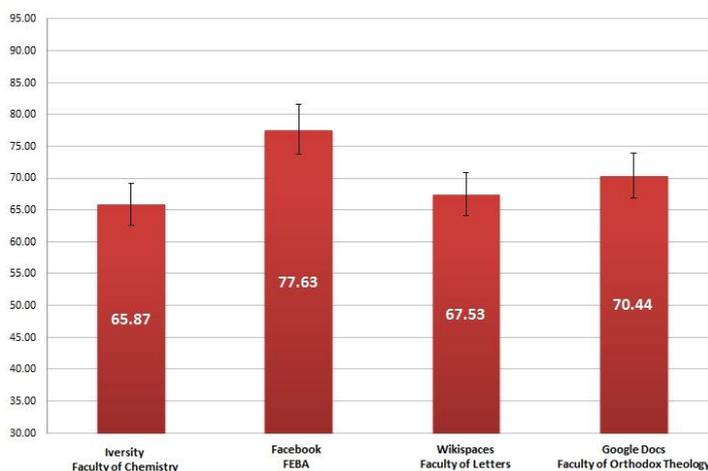
Study 3

<u>The third study</u> aimed to assess of the usability of Facebook, Google Docs, Iversity and Wikispaces in order to recommend them as alternative instruments for supporting learning in online environments.

Each of these four technologies was used during the first semester of the academic year 2011 – 2012, and their assessment took place at the end of the term.

Table 3. Methodology – Study 3

Participants	20 students from the Faculty of Economics and Business Administration 17 students from the Faculty of Orthodox Theology 144 students from the Faculty of Letters 23 students from the Faculty of Chemistry
Tools used for data collection and interpretation	1. System Usability Scale (SUS) – (Brooke, 1996) 2. SPSS
The period and the context of the activity	January 2012

The hierarchy of these technologies according to the obtained SUS scores is as it can be seen in the image below.

Figure 2. Distribution of SUS scores' averages

A Curriculum Development Model

Chapter 5   In the last chapter of our thesis we combined the results of the research, the experiences and the useful resources from the literature in order to suggest a model of curriculum development for the training in ICT field by fostering the collaborative learning (Figure 3). This model opens new research perspectives for specialists in the field and for the teaching staff whose target is to integrate ICT into the teaching process.
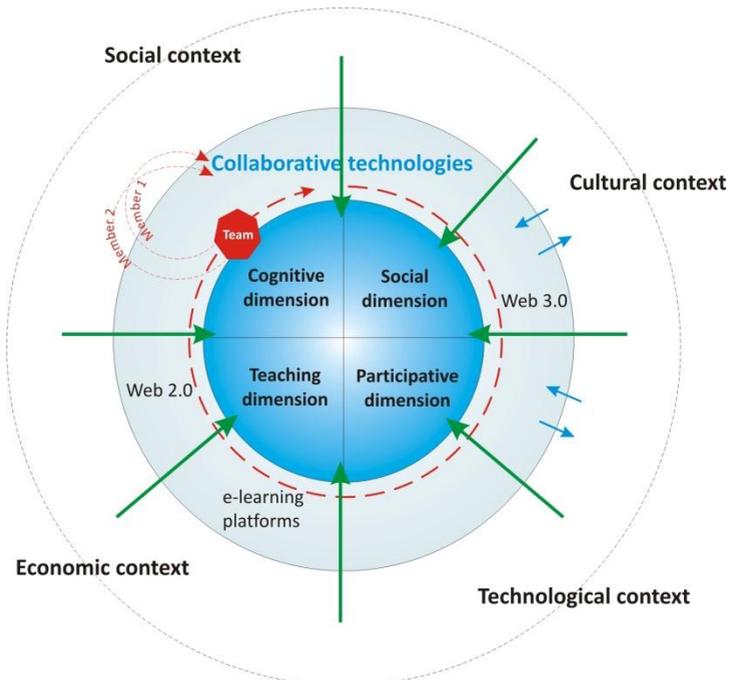
A curriculum development model

Figure 3. A curriculum development model for fostering collaborative learning in the virtual environments

The components of this model are:

Curriculum development model's components

- **The external environment** whose components are the social context, the cultural context, the technological context and the economic context;
- **The new technologies** and their potential in supporting the collaborative learning (platforms, blogs and other applications – web 2.0 or web 3.0 type);
- **The collaborative learning** with its four dimensions: the cognitive dimension, the social dimension, the participative dimension and the teaching dimension (Persico et al., 2010);
- **The learning teams and their members**;
- **The relation between model's components and the influence** these components have upon the other components.

This last chapter contains a series of suggestions related to the integration of new technologies in the teaching activities and few solutions for facilitating this approach. The suggestions proposed in the final chapter are based on the results obtained during our research approach and after literature review. These suggestions are mean to be considered by:

Suggestions

- Higher education institutions;
- Professors / Trainers / The future teaching staff;
- Tutors (Dicks, 2010, Renon Pychyl and Motz, 2008);
- Students involved in the ICT in education training process.

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Conclusions and Further Research

In the final section of the thesis we introduced a series of conclusions organised by thesis chapters, we mentioned the limitations of our research or aspects that can be further developed from different perspectives and a series of new research directions.

Limits   Regarding the content of the thesis there is an aspect that can be considered a limitation: although the topic is a present-day one and it is addressed at both, national and international level, due to the dynamics of the technology development and implicitly of the changes that are about to take place in education in the following years – changes influenced by technology – a great proportion of our thesis's content might not be useful in the next decades.

Because we cannot generalise the obtained results we will consider further research involving a higher number of participants and taking into consideration other dimensions such as: the organisational culture and the longevity in using ICT while learning.

New research directions   When we started an action research that will not be finished once our research is over, we offered the opportunity to other researchers or interested practitioners to continue our approach in order to improve the educational process supported by new technologies or in order to adapt to the informational era and society, in general.

The curriculum development model presented in the fifth chapter can be used and adapted in different training programs, not only in those for instruction on how to use ICT.

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Virtual mobilities which were mentioned in our thesis might be the subject of inter-organizational studies involving UAIC and other higher education institutions that offer study scholarships or host Erasmus students.

Initiating and organising a pilot training program for e-tutors from UAIC in order to encourage the use of new technologies for supporting learning is another research direction we will consider.

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