NEW CHALLENGES OF SUPPORTIVE TECHNOLOGIES FOR EDUCATION

Eugen Petac, Assoc. Prof., Ph.D., "Ovidius" University of Constanta, Romania,
e-mail: epetac@univ-ovidius.ro

Abstract

Training, learning, teaching are fields that are subsumed to educational activities. Each of these activities intersects with the specific intervention of the new technologies. Supportive Technologies are a range of technologies available to assist the main activities. For education domain, Information and Communication Technologies (ICT), as a Supportive Technologies, is the key to ensure the road to Knowledge Society. With this respect, in the second part of this work are outlined several basic aspects on Interaction and Computer Supported Cooperative Work technologies. The ProWeb project, as a model of good practice on the use of supportive technologies for education, is presented in the third part of this work.

1. INTRODUCTION

We are all witnesses to an unprecedented rate of development of the human society. The new technologies are the engine of this development. Through *technology* term we understand "The application of scientific knowledge for practical purposes, especially in industry/ Machinery and equipment developed from the application of scientific knowledge/ The branch of knowledge dealing with engineering or applied sciences" [1]. In a broad sense technology means "the purposeful application of information in the design, production, and utilization of goods and services, and in the organization of human activities" [2].

The technology must be in general "useful, easy, pleasing, supportive" [3] and moreover, "Technology that's supportive is not only useful, easy, and pleasing; it helps users flourish" [3]. Flourish has five basic elements of well-being, known in Positive Psychology by the acronym PERMA: Positive emotions (including life satisfaction); Engagement (or flow); Relationships (positive ones, that is!); Meaning (or purpose—belonging to and serving something bigger than the self); Accomplishment (or achievement) [4].

"Information and communications technologies (ICT) are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." [5]

The importance and potential of ICTs is to improving the socio-economic development of all human beings. Also, that ICTs should not only be seen as a medium of communication, but also as a development enabler to achieve Millennium Development Goals (MDGs) [6]. Some possible impacts of ICTs on the different MDGs are presented in Table 1 [6].

In Information Society based Knowledge, the role of information and communications technology (ICT) has been changed from the instrument of technological change in a tool that

provides a new potential: the information embedded in ICT systems combined with people's creative potential for the development of the knowledge of these [7].

Table 1. Some possible impacts of ICTs on the different MDGs [ITU (2003, 2006a)**]**

MDGs	Impact of ICTs
1	Increase access to market information and reduce transaction costs for poor farmers and traders
2	Increase supply of trained through ICT- enhanced distance training
3	Deliver educational and literacy programmes specifically targeted at poor girls and women using appropriate technologies
4,5 & 6	Increase access of rural care-givers to specialist support and remote diagnostics Enhance delivery of basic and in-service training for health workers Increase monitoring and information-sharing on disease and famine
7	Remote sensing technologies and communication networks permit more effective monitoring, resource management, mitigation of environment risks
8	Increase the number of IT graduates and reduce youth unemployment

2. FROM INTERACTION SOCIETY TO KNOWLEDGE SOCIETY

Peopleware joins the hardware (the physical components that make up a computer) and the software (computer programs which states "what to do"). Peopleware highlights the role of the people in the development or use of computer software and hardware systems, including aspects such as: developer productivity, teamwork, group dynamics, psychology of project management, organizational factors, human interface design elements, interaction man-machine etc.

"A man who is working with computer, without doing any calculations must be more competent than the one who is performing calculations" noted the Romanian academician Grigore Moisil [8]. In this regard, a solution is Computer Supported Cooperative Work technologies [9]. A definition of interaction and interaction support and how it relates to the concepts of communication and collaboration (Ljungberg,1999;based on Dix& Beale,1996) is presented graphically in Figure 1.

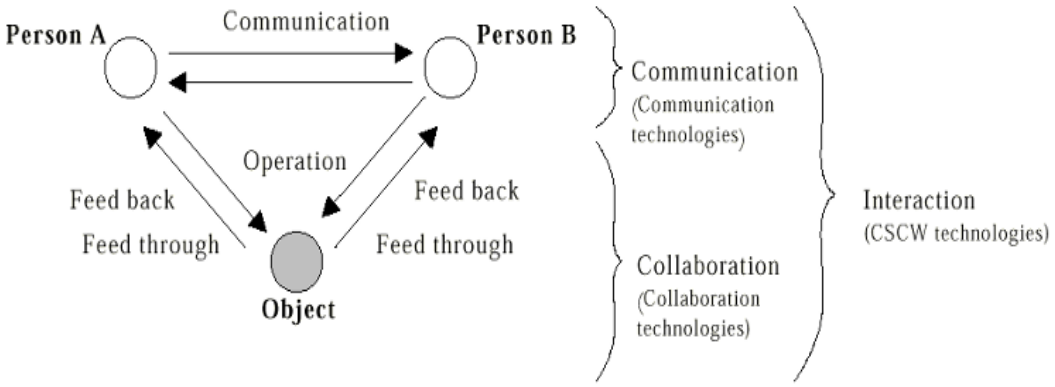

Figure 1. Interaction and CSCW technologies [9]

The new programs of education adopted multisensory learning methods. Multimedia systems are gradually replaced by multimodal systems based on virtual reality.

- A multimedia system uses various media communication of information. For example, a computer-based learning system uses video, animation, text, pictures, backgrounds that are based on

visual interaction.

- A multimodal system uses at least one sense (way) of interaction. The technologies for multimodal interfaces aim: speech recognition, language understanding, Pen-based gestures, body movement tracking, sound recognition, measurement of pressure, speed, acceleration, location. A Multimodal Interaction (MMI) Architecture is presented in Figure 2.

- Virtual reality refers to artificial environments created on a computer that provides a simulation of reality: the user can get almost any real impression of the physical presence, both in some real places and imaginary places. It is known the formation of three groups in terms of the receptivity of the information: visual, auditory and kinesthetic. Artificial vision is created through multimodal systems.

The virtual experiment is an alternative or complementary source to study the naturally occurring phenomena and processes. Educational lessons, which propose a virtual experimental support, can use various teaching technologies, distributed in a variety of shapes and functionalities. In this respect, it can specify a range of educational technologies used in conducting the following experiments [5]: abstract backgrounds and simulation of learning environments, data collection tools and visualization, collaboration tools, partner-learning tools and computational environments.

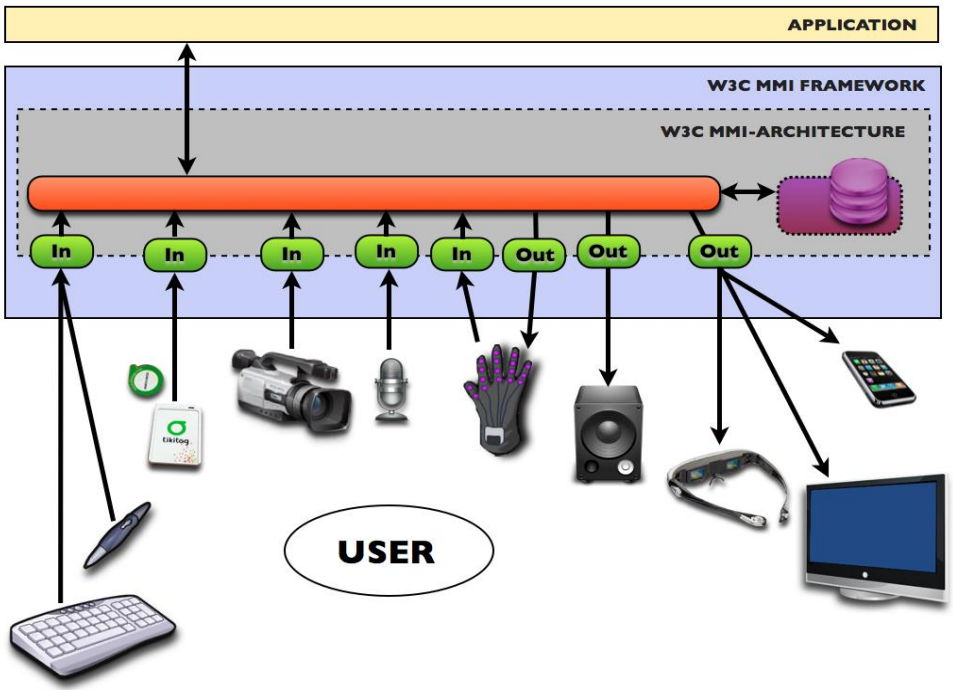

Figure 2. Multimodal Interaction Architecture [10]

Information Society based Knowledge means more than the advancement of technology and informatics and communications applications, also integrating the social, environmental, cultural and economic dimensions. A vector of the knowledge society is a tool that turns the Information society into a Society of knowledge. Two major classes of vectors of the Knowledge Society are [11]: technological vectors and functional vectors. Technological vectors of the Knowledge Society are: The Internet, Technology of electronic books, Intelligent agents - artificial intelligence expert systems (Data Mining, Discovery Knowledge), Smart environment, Nanotechnology and Nanoelectronics. Functional vectors of the knowledge society are: Knowledge management, The management of moral use of the knowledge at a global level, Biological and genomic knowledge, Health care system at individual and social level, Protection of the environment and ensuring of a

sustainable society and sustainable, Deepening the knowledge about the existence, Generation of the knowledge of new technology, Development of a culture of knowledge and innovation, An educational system based on the methods of information society and knowledge.

3. PROWEB AS A GOOD PRACTICE MODEL FOR THE USE SUPPORTIVE TECHNOLOGIES FOR EDUCATION

"Ovidius" University of Constanta, Romania, is implementing the project called "Network of continuous training of teachers to use multimedia, virtual instrumentation and Web 2.0 in the curricular area of Mathematics and Natural Sciences (ProWeb)" POSDRU 1.3/157/S/141587" project [12], as a P1 partner. "Valahia" University of Targoviste, as the beneficiary of the grant, has as project partners "Ovidius" University of Constanta, "Constantin Brancusi" University of Targu-Jiu, "Lucian Blaga" University of Sibiu and "Stefan cel Mare" University of Suceava. The launching reunion of the ProWeb project, planned to take place throughout 18 months, was hosted by "Valahia" University of Targoviste on the 15th of July 2014 at The International Center of Conferences.

The overall objective is to improve continuous training ProWeb teachers from the target group through development and implementation of innovative didactic instruments in the eight development regions in Romania. The activities developed in ProWeb project, co-financed by the European Social Fund through The Operational Sectorial Program of Human Resources Development 2007-2013, contribute to obtaining the specific objectives of the Prioritary Axis 1 and the major domain of intervention 1.3 "Development of human resources in education and training". A total of 150 members of the target group of Romanian counties Constanta, Tulcea and Vrancea, teachers of undergraduate curricular area Mathematics and Natural Sciences, working under the direct guidance of a team of academics from the "Ovidius" University of Constanta. With a vast experience in the training, they conduct training activities, theoretical and practical, project-specific and evaluation activities.

The target group of the entire project ProWeb, comprises a total of 850 teachers of undergraduate curriculum area Mathematics and Natural Sciences, in 28 counties. The target group members benefit from free training program with ongoing activities, laboratory and practical activities, both directly and on-line e-learning platform ProWeb project [12]. This is the online home for the applications of the training program comprises courses and educational resources for practical applications and is established as a training management system, assessment and communication. To these are added a virtual toolbox (multimedia software, educational applications specific Web2.0 applications), database of the target, group management system of the documents related to training, web page of the project ProWEB.

The training program is organized in two modules, each module comprising two disciplines:
Module 1 - Modern approaches in teaching mathematics and natural science disciplines Fundamentals of pedagogical use of ICT in teacher training in the curriculum area of Mathematics and Natural Sciences and Technologies and multimedia and hypermedia in modern education.

Module 2 - E-education in the curriculum area of Mathematics and Natural Sciences, educational disciplines of Web 2.0 applications in their curriculum Mathematics and Natural Sciences and Virtual Instrumentation and educational software.

Below the subjects and their corresponding items are presented.

Fundamentals of pedagogical use of ICT in teacher training in the curriculum area of Mathematics and Natural Sciences:

- ICT and education in the context of the knowledge society: The knowledge society and the new information and communication technologies; European policies on ICT in education; Digital skills in the context of the national curriculum.
- Teacher in the Knowledge Society: competence profile of the teacher; New roles of the teacher in the context of the knowledge society.
- Fundamentals of pedagogical use of ICT in education: the paradigm centred on skills training; The paradigm of learner-centred education process; Constructivist paradigm. Educational implications; The theory of multiple intelligences (TIM) and effective learning.
- The use of ICT in the curriculum area of Mathematics and Natural Sciences: Specify design, organization and carrying out educational activities based on using ICT; ICT - tools that support the lessons of Mathematics and Science (Chemistry, Physics, Biology); The role of ICT in school evaluation; Advantages and limitations of using ICT in their curriculum subjects of Mathematics and Natural Sciences; ICT and ensuring equal opportunities in education: The principle of ensuring equal education opportunities; ICT - way differentiation / individualization of training; The impact of ICT on learning.

Multimedia and hypermedia technologies and applications in modern education:

- Multimedia Technologies in Education: Multimedia and multimedia systems. Concepts. Components; Applicability multimedia; Multimedia in education and training; Valences of multimedia use in the educational process; Taxonomy multimedia applications for training.
- Multimedia training systems: Components hardware / software; Digital representation of information; Digital image. Computerized sound. Digital representation of video; Standards and multimedia data compression methods; The use of multimedia systems in the educational process. Multimedia educational presentations; Educational multimedia documents.
- Multimedia and Internet in education: Multimedia and HTML. Images and animation for WWW; Hypermedia; Multimedia Authoring Tools; Materials and multimedia educational applications. Jokes. Simulations. Educational games. Virtual reality.
- Educational multimedia services: visual identity; The design of animated educational videos; Video editing and processing in order to achieve educational videos; Teleconference. Videoconference.

Educational applications of Web 2.0 in the curriculum of Mathematics and Natural Sciences:

- Features of training in the digital era: Education 2.0 - digital natives versus immigrants digital; Paradigms of the third millennium education (e-learning, m-learning, u-learning, b-learning).
- Web 2.0 - the next generation of the Internet - history, principles of functional architecture; Web 2.0 concept and characteristics; Specific services; Challenges of using Web 2.0 in education; Best practices on integrating the specific applications in pre-university education.
- Web 2.0 tools typology: Architecture Web applications. Popular Web 2.0 tools for trainers; Web 2.0 tools suitable for teachers of Mathematics and Natural Sciences.

Virtual instrumentation and educational software

- Methodologies and pedagogical strategies used to integrate virtual experiments in education; The teacher's role in the integration of new technologies; Principles and elements of design training.
- Educational software for Mathematics: Geogebra; Cabri software; Yenka software packages. Yenka Mathematics.

- Educational software for physics: Yenka Science (Physics Yenka); Algodoo; Powder Toy; Online educational tools.
- Educational software for Chemistry: Yenka Science (Chemistry Yenka), Virtual Chemistry Laboratory, Jmol.
- Educational software for Biology: Human Anatomy Atlas; Gene Coder; Web resources for teaching biology.
- Educational applications for mobile devices: Classification of mobile educational applications; Mobile Application integration in school activities.

A number of other activities that were planned to take place after the periods of training and evaluation will contribute to project success. These include: promotion and dissemination, organization of workshops and seminars, creating a portal of information and a virtual network for training of teachers.

4. CONCLUSIONS

Information Society based Knowledge means more than the advancement of technology and informatics and communications applications, also integrating the social, environmental, cultural and economic dimensions. From the range of technologies available to assist the main activities, Supportive Technologies facilitates this integration process. Interaction and Computer Supported Cooperative Work technologies are the recommended solution for a modern education. "Competence in the virtual world as in the real education!" is the slogan under which the activities are carried on in the project ProWeb. The overall objective is to improve continuous training ProWeb teachers from the target group through development and implementation of innovative didactic instruments based the latest Information and Communications Technologies. As a result of the work done by everyone involved, we can say that this objective of this project has been achieved. This is the reason why ProWeb can be defined as a model of good practice.

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