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E-LEARNING TECHNOLOGIES IN SUPPORT OF EPISTEMIC COMPETENCY

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***Abstract**: The article explores the e-learning facilities that can be useful in the development of the epistemic competency project. It offers a possible bridge between epistemology, metacognition and IT relevant tools, altogether assembled in an attempt towards a holistic approach. The goal is to provide the learner with a friendly environment for learning complex notions dealing with knowledge that can prove essential in better tackling everyday complex problems.*

***Keywords:** LMS, LCMS, e-learning, technologies, epistemic competency*

I. A BRIEF INTRODUCTION TO E-LEARNING AND THE EPISTEMIC COMPTENCY PROJECT

We all agree that the World Wide Web is a powerful instrument in nowadays society. Since its beginning it has represented a profound change for communities, organizations and markets. It also appears that the environment of higher education is evolving in corelation with the "e-fever" that unfolds under our own eyes. There are costs that rise, budgets that shrink and needs that develop, all of these determining educational institutions to reshape the way education is delivered. As a consequence, e-learning is used more and more frequently in higher education systems, creating some new and thus not so well understood opportunities for a symbiotic linkage between education and technology.

In order to better tackle the problem afore mentioned one needs to proceed in an analytical fashion. First of all we have to define e-learning. The term represents an expression "generally used with the purpose of creating an instructional content and a learning experience which could be delivered or transmitted by electronic means and technologies" [1]. One may also find other definitions of e-learning that have a more restrictive character, for example, shaping the space of e-learning to the content delivered on the Internet. The conceptual models of e-learning used in higher education are shaped on conventional distance education. It's initial purpose was, of course, to offer some individuals in areas with rural quiddity access to higher educational levels. In such way the distance learning has evolved dramatically over time [2].

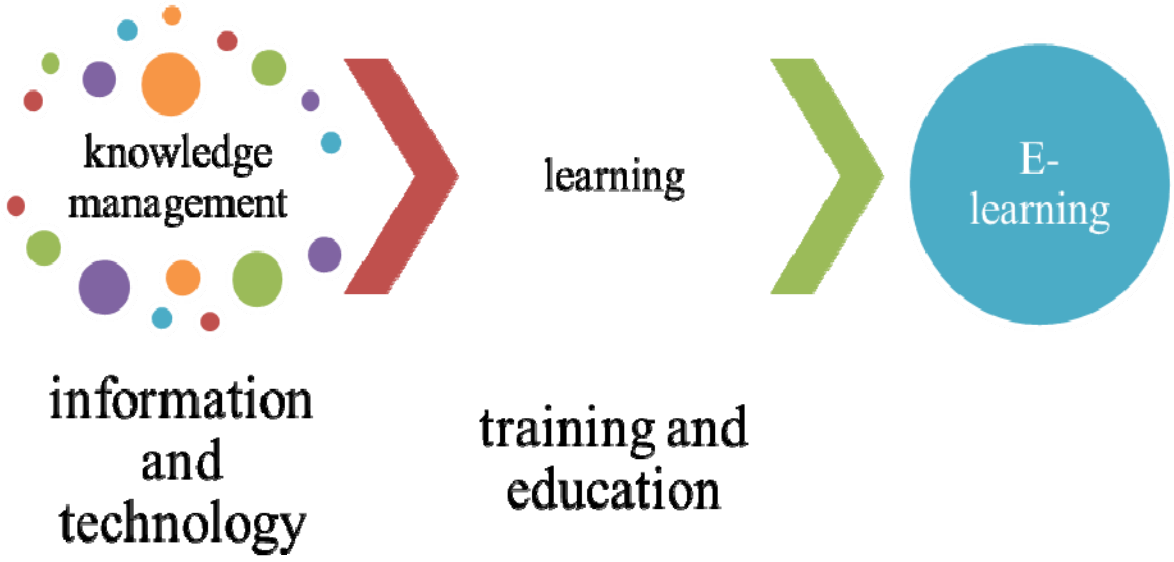
The turning points in the development of e-learning were marked by the major IT breakthroughs of the last century. For instance, the integration of radio broadcasting in the 1920's gave birth to the notion that teaching could be done at large distances. Of course, the Internet has activated a tremendous innovation frenzy in education. As time passes, the number of people who gain access to the Internet rise and the cost of computer ownership decreases as the overall computer literacy increases. These major trends offer to the educational institutions an ideal channel for the most discussed delivery of educational content [3].

Compared with classical training, e-Learning is very adaptable. It gathers under the same roof numerous fields of thought and practice, and we couldn't summarize it into a simple formula for success.

Figure 1 encompasses a large array of academic perspectives: "first of all the training and the education, second of all the learning and the knowledge, and of course the technology and the investigation of individual market segments"[4].

When considering those key concepts we may summarise that e-learning deals with multiple complex issues like knowledge, learning and organizations.

Figure 1: The fields of e-learning



But how does the e-learning system could support the epistemic competency project? Let's take a look on Fritjof Capra's work first. In *The Turning Point*, Capra explores the "perverse" consequences of managing the world in an out-of-date information processing horizon. In order to explain the problems of mankind at the beginning of the 21st century, Capra argues that: „...most academics and teachers subscribe to the narrow perceptions of our reality which are inadequate and not proper for dealing with the major problems of our time. These problems are the systemic problems. This means that they are closely interconnected and interdependent. They cannot be resolved and understood within the fragmented methodology characteristic of our academic disciplines and government agencies. Such an approach will never resolve any of our difficulties but will merely shift them around in the complex web of social and ecological relations."[5]

The epistemic competency project is about using the knowledge available today in order to solve everyday problems in organizations and in one's private life. On the one hand the competency was conceived as having the basic metacognition abilities and knowledge so as to manage one's processing information capacity and on the other hand, to have the skills to browse the knowledge available and extract in a timely fashion the benchmarks needed in order to solve practical problems. The former direction implies the evaluation of one's solving problem capacity, creativity, intelligence, competencies and abilities and to project the results desired and the way to obtain them. The latter would consist mainly on handling scientific theories in the heuristics required by everyday life, knowing the limits of the several horizons of knowledge identified so far (mystic, empiric, philosophic, scientific). The two components and their interaction would make one a better processor of information with all the benefits implied for oneself and others affected by one's decisions.

In what follows we shall explore some of the advantages that new ICT technologies can provide for the implementation of the epistemic competency project and thus bring a modest contribution to the problem that was signaled by Capra.

II. SYSTEMS AND MEANS THAT CAN BE USED IN THE DEVELOPMENT OF THE EPISTEMIC COMPETENCY

A big advantage of the e-learning process is that it allows participants to control their own timetables and master learning around their other gaps. This is an important aspect, especially for adult learners. It means, that applied in the deveopment of a competency (e.g. the epistemic one) one could sketch a personal rhythm needed in nowadays rush.

Analyzing the way communication evolves we understand that the technologies used in this asynchronous process also allows a two-way communication between learners and instructors, or multi-directional, collaborative communication among learners themselves.

This is translated into the development of the relation between the two sides. For example, we could create a functional *mentor-protégé* relation that will sustain the growth of the main characteristics of the epistemic competency.

In the next lines we present some means of communication most commonly used in asynchronous e-learning processes :

- Email
- Message boards
- Text chat
- Forums
- Threaded discussions
- E-boards
- Application sharing
- Simulations laboratories
- Virtual laboratories
- Library session cache access
- Learning session cache access
- Real-time evaluation
- Real-time tests
- Video streaming
- Audio streaming

But let's consider the perspective from the instructor's point of view. We argue that the e-learning could resize management skills that permit instructors to establish work groups and manage interaction between students doubled by receiving feedback in real time.

E-learning also means real-time reporting on progress, and why not to track student and teacher activities. So we could conclude that the e-learning will permit the instructor to track the development of the competency main cores.

In the above table, there are described, from the instructor's point of view, the main befits of the e-learning process.

We are to understand that even though the e-learning has lots of benefits it couldn't replace all the time the normal learning system, in our case in the development of the epistemic competency. But the benefits that are noticeable and are quite interesting.

Further more, in order to understand better what e-learning consists of, one should analyse the technologies used in the process. We argue that they cover three main areas of activity.

The first is the area of the content creation and management and it gathers under the same roof the functions of sourcing, creation, storage and management of e-learning content —which are typically addressed by a LCMS (learning content management system).

The second is the area of the learning management. It refers mainly to the capture of information concerning the learning resources and its application. It also sums up the existing skills and the learning activities used for measuring and managing learning outcomes at a high level of organizational level. These functions typically addressed by a LMS (learning management system).[6]

The third area is the area of the learning activity. It mainly talks about the delivery of e-learning content and about how the interaction and learning assessment are facilitated. We face here some functions that are usually performed by instructors or trainers [7].

Figure 2: Top four online learning benefits compared to other learning technologies, *Education Lifelong Learning Group 2001,p. 12.*

Online learning benefits	Computer/ CD-ROM	Electronic simulation	Tele-conference	Television broadcast	Video/ television/ radio
Learner control	Learner control of space but not content	Reduced learner control; good learning retention	Reduced learner control	Reduced learner control	Reduced learner control
Accessible from anywhere, provided learner has Internet access	Reliably accessible, irrespective of bandwidth, but hardware-dependent	Consistent delivery, but may require high bandwidth	Consistent delivery, but requires high bandwidth	Consistent delivery; compatible with existing networks	Consistent delivery; compatible with existing networks
Available on demand	Available on demand	Just-in-time learning	Availability is time-dependent; affordable for groups	Availability is time-dependent; affordable for groups	Availability is time-dependent; affordable for groups
Personalized learning	Limited customization	Customized to individual/ group context	Limited customization	Limited customization	Limited customization

As a simple relationship between areas, we argue that a LCMS first generates, then stores, structures and delivers the needed content. In the same time we agree that LMS is more like an administrative tool that handles facts like the enrolment or the registration. It also provide continous tracking for students' progress and the assessment scores. Let's now focus on the learning content. It is created by using authoring tools. They ussualy represent functions of the LCMS. A solid composition of LCMS is provided by Brennan, Funke and Anderson in 2001 [8].

They identify the following main building blocks that a good realistic LCMS will provide:

- easy-to-use content creation tools and support for reusable learning objects;
- flexible course design and delivery;
- administrative functions and assessment tools;
- open interface with a LMS or other enterprise system;
- communication and collaboration functions;
- security functions;
- facilities for content migration;

In addition, LMS is designed to operate at the other side of the learning trajectory, supporting and analyzing the learning transaction; their focus is on assessing learning outcomes and appraising the relationship of outcomes to investment.

It will be a real challenge for the research team to take the complicated models developed in epistemology or psychology and turn them into simple and attractive bits of information, comprehensible even when presented on a mobile phone screen. However, it seems that this is the only way philosophy and science can leave their ivory tour and go down in everyday life.

III. CONCLUSIONS

The emergence of Internet has had a particular interest to many stake-holders in the e-learning field. It offers a user-friendly graphical interface through which "learners" gain access to large quantities of information, including all sort of media files (images, data files, sound and text). Also, we are witnessing a rapid growth of the new communications technologies that offer mobile Internet access that can open a whole new range of possibilities for the distance learner.

Any assessment of the potential of e-learning must fit all these technologies. The major advantage of this technological boom is that we may enable a large number of people to make contact with our models. So, the implications in the development of the epistemic competency and the e-learning process in general are quite extensive.

In the process of presenting all these remarkable new technologies one may get to excited and forget about the underlying theoretical framework that supports the epistemic competency project. Technology is not the whole story. In fact we argue that the structure and content of this approach are a natural consequence of the need to grow the "epistemic competency of decision-makers" on a solid theoretical and methodological background and, of course, on a friendly, more up-to-date graphical interface.

On the above described background, the development of the epistemic competency could be done by making a mix between the technological means. We are planning to develop an interacting Serious Game that would have modules concerning knowledge and knowledge management and that could be played online on an e-learning platform. Also, educational content could be inserted on the platform and various evaluation tools so as to assist the learner in building up the epistemic competency. A blog, an e-mail group and various social networks accounts (Facebook, Twitter, LinkedIn etc.) would be provided to the learner in order to facilitate linkage. The mobile learning facilities are also on our agenda as they give learners and even more freedom of movement.

The epistemic competency project is still in its early days. There are still many theoretical and methodological unknowns that could influence the use of e-learning technologies. However the technological side must not be underestimated. Only by being aware of the impact of e-learning we may obtain the results desirable in the epistemic competency framework.

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