

The Interoperable Learning Contents on Enterprise Interoperability^{*}

POIER R, SANCHIS R, LARIO F C

(CGIP, Universidad Politécnica de Valencia, 03801 Alcoy, Spain)

Abstract: This paper presents an experience carried out in 2007 in Europe under NTEROP Network of Excellence to develop Educational Contents on Enterprise Interoperability offered through an eLearning Platform. The paper presents analyses the concept of eLearning, the pedagogical approaches, the eLearning dimensions and finally presents the practical experience. Future perspectives to further extend the NTEROP Educational Contents are outlined and conclusions are drawn at the end of the paper.

Key words: Interoperable Learning; Enterprise Interoperability

CLC number: TP31 **Document code:** A **Article ID:** 0529-6579 (2007) S2-0151-05

1 Introduction

Europe's future economy and society are being formed in the classrooms of today. Students need to be both well educated in their chosen field and digitally literate if they are to take part effectively in tomorrow's knowledge society. eLearning (the integration of advanced information and communication technologies - ICT - into the education system) potentially achieves both aims. The eLearning initiative of the European Commission seeks to mobilise the educational and cultural communities, as well as the economic and social players in Europe, in order to speed up changes in the education and training systems in Europe's move towards a knowledge-based society.

Learning is the development and acquisition of knowledge or capability through study, real experience and understanding. It is a gradual activity that has influence, guides and causes long-term changes in the potential behaviour and personality. Therefore, the process of learning is an increase in the skills for effective action. Personal, group, and organizational learning can all be measured by the outcomes that result from effective action.

The fast growth of Information and Communication Technologies (ICT) makes feasible to define and create new ways of education, learning and training. Many years ago the new way of learning was based on Computer Based Training (CBT), which used primary CD and local area networks as information medium. Currently, this term has evolved to eLearning through the

use of Internet, Wide World Web and Learning Management Systems that have fundamentally altered the practice of distance teaching and learning.

2 eLearning

eLearning is a new form for managers and educators to deliver high quality training material. In the past, trainers had to either find the time to develop their own classroom or workshop materials. With eLearning, all the work is done for users and it is possible to print on-demand as many courses as users need when users need them.

The concept eLearning, also called Online learning, Networked learning, Electronic learning, Internet-based Learning and Web-based Learning, is a general term that relates to all training material that is delivered with the assistance of a computer. eLearning applications are generally built around the interactive multimedia. Learners see text, graphics and animations in eLearning courses. Other mediums that may be present primarily include video and sound. There is usually a feedback mechanism built in for users to respond. The instructional approach varies widely from having plain multiple-choice questions to complex simulations. eLearning applications can be developed in any field or area, with any nature of content and performance outcomes.

eLearning is very helpful to build cognitive skills - procedures, facts, and conceptual knowledge. It has been extraordinarily successful in the field of soft skills: management, leadership, interrelationship man-

收稿日期: 2007-10-28

作者简介: POIER R (Born in 1969), Male, Professor. E-mail: poier@cgip.upv.es

agement etc.. But eLearning present problems with psychomotor skills due to they need practice. Although eLearning is not capable to teach these skills but it can provide critical knowledge components related to these capabilities.

Currently, one concept related to eLearning that has obtained great popularity is mLearning. This term must include the ability to learn everywhere at every time without permanent physical connection to cable networks. This can be achieved by the use of mobile and portable devices such as PDA, cell phones, portable computers and TabletPC. They must have the ability to connect to other computer devices to present educational information and to realise bilateral information exchange between the users and the instructor (Georgiev et al., 2004).

Nowadays, the tendency of eLearning as an optimal process to train is growing up. Increasingly organizations are adopting online learning as the main delivery method to train employees (Simmons, 2002).

3 Advantages and disadvantages

eLearning provides flexibility because it offers learners with increased choice, convenience, and personalization. In particular, flexible learning provides learners with choices about where, when, and how learning occurs. For those participants who have others commitments, eLearning facilitate the communication between them, great adaptability to their needs, the ability to work at users own pace and more variety in learning experience with the use of multimedia and non-verbal presentation of training material.

For learners, online learning knows no time zones, and location and distance are not an issue. In synchronous eLearning, trainer and users are involved in the course, class or lesson at the same time (synchronized). Web conferencing is an example of synchronous eLearning. Participants can log on with an instructor and interact with participants at multiple facilities or locations. In asynchronous eLearning, trainer and users are involved at different times (not synchronized or asynchronous). Examples include job aids and programs on a shared drive, web-based training (WBT), electronic bulletin boards, blogs, and email.

But there are several researchers of different fields (ITC, Psychology...) that critic eLearning arguing that this process is not longer educational in the highest philosophical sense. Moreover, eLearning is characterized by the lack of face to face interaction with a trainer, what confer isolation feeling of users.

To solve this problems, eLearning techniques provides several options to motivate human interactions through web conferencing programs, threaded discussion boards, forums, email etc.. Many authors argue that the best solution for these problems is to alternate eLearning training with face to face classrooms, what is known as Blended learning.

4 Pedagogical Approaches

There are four fundamental pedagogical perspectives which historically have influenced the approach to computer based pedagogy: distance education and continue to provide guiding principles for the pedagogy of eLearning.

The Cognitive perspective focuses on the cognitive processes involved in learning as well as the way the brain works. Greitzer (2002) outlined a set of cognitive principles to guide the creation of learning applications. These principles are stimulate semantic knowledge, manage cognitive load, problem centred, interactive and frequent and varied practice. The foundation for the design and implementation of these principles is the notion of interaction elements, which form the basis of our student centred/active learning approach. Interaction elements are basic objects for engaging the learner through ideas, problem solving activity, or interaction. By associating specific learning objectives with interaction elements, the instructional designer can transform them into learning objects that transcend their original purpose and enable their re-use by other courses that call upon the same or similar learning objectives (Greitzer et al., 2003).

The Emotional perspective focuses on the emotional aspects of learning, like motivation, engagement, fun, etc. Keller (1983) synthesized existing research on psychological motivation and created the ARCS model (Attention, Relevance, Confidence, Satisfaction) as a framework to exploring the emotional components in the design of eLearning applications. It is very important to gain the learner's Attention, assuring that what they study has Relevance, allowing them to proceed with Confidence, and having the outcome provide Satisfaction. In order to achieve all these components, eLearning must be more fun, more gamelike (Quinn, 2006).

The Behavioural perspective focuses on the skills and behavioural outcomes of the learning process. Role playing and application to on the job settings.

The contextual perspective focuses on the environmental and social aspects which can stimulate learning. Interaction with other people, collaborative discovery.

and the importance of peer support as well as pressure

5 The INTEROP Educational Contents

In this section we describe the case of the European Project titled “ Interoperability Research for Networked Enterprises Applications and Software (NIEROP)”, financed by VI Framework Programme for Research and Technological Development set up by the European Union (EU) with reference number IST-508011.

Within the overall spirit of the ERB NoE instrument, the NIEROP Network of Excellence will concentrate an important part of partner efforts on the application of suitable eLearning techniques to train the current and future European research community. All these strategic activities are specifically addressed by one of the tools that NIEROP has put into service to achieve this objective, the NIEROP Education Program, which is under the responsibility of a specific Spreading of Excellence Activity (SE). Formally, the aim of this activity is to provide training facilities to spread knowledge added by NIEROP inside and outside the network during and beyond the EU-funded period using suitable e-techniques.

The NIEROP Education Program revolves round 6 main axes, each one addressing a specific function and objective.

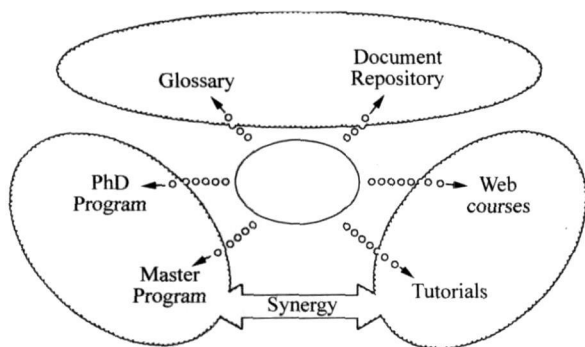


Fig 1 The NIEROP Education Program

The NIEROP Glossary is a key factor within the Educational Program, given that it allows to unify semantics, to classify documents by topics and keywords and to provide a list of relevant domain concepts for educational objectives. In the last few months, this task has gone beyond initial objectives given that several NIEROP activities have ascertained the need for identifying a glossary of interoperability terms for a variety of tasks, for example, building a knowledge map or classifying partner competences for the NIEROP mobility

matrix. Thus the glossary is becoming a cornerstone within the entire project. The first version developed in the spreading activity is now being transformed into a taxonomy by a new activity explicitly defined for this objective.

The IEKR (Interoperability Explicit Knowledge Repository) is the name given to the repository which will store any document related to the interoperability domain. This virtual library will be used by the research community to consult the largest European repository of electronic documents about the interoperability domain.

Tutorials and Web courses, directed to PhD students, researchers and enterprises, are provided as a training and learning service in the domains of Enterprise Modelling, Architectures & Platforms and Ontologies. They are conceived to improve understanding of Interoperability and will serve end users, consultants and academia. Currently, some tutorials and web courses are in development.

The results of previous activities will be used as the main information source for the creation of specialized European Master and PhD programs on Interoperability. The NIEROP Master will be consisting of courses developed from existing contents and adapted and unified according to the developments of NIEROP. The Master will combine virtual and face-to-face courses. The face-to-face courses will be lectured at different European Universities. Likewise, the doctorate program will be made up of existing doctorate courses on Interoperability at different universities. The courses will be selected and adapted to provide a unified offer. The program will be also consisting of virtual and face-to-face courses. The students will follow the courses selected in a university, while each lecturer will teach his course in several European universities according to a mobility calendar.

5.1 The Learning Cycle

An eLearning strategy is not only related with the way of sharing existing knowledge. In a Collaborative Research Project also the new generated knowledge must be disseminated. A procedure to capitalize existing knowledge and creating new knowledge is needed.

The GNOSIS Knowledge/Learning Cycle (Poler and Tornos, 2003) promotes an integrated approach to the capture, organization, access and use of intangible assets in a specific Knowledge Domain.

the information that users are interested in. Tutorials are classified depending on its specificity and complexity.

Web courses that are individual study units offered within a program and plan. They are decomposed into a sequence (or a tree) of learning objects and interactive content using sophisticated media systems. The difference between tutorials and web courses is that the contents of the last ones are broader than tutorials. Moreover, other options will be introduced as reviews, gaps, series, quizzes, etc..

6 Conclusions

The Educational Contents on Enterprise Interoperability comprises 45 Tutorials and 15 Web Courses. The contents were available to the 500 researchers of the NIEROP Network. In order to validate the quality and interest of the educational contents analysis of accesses and assessments were performed. The average score for the assessment was upper than 80%. The Web Courses were followed also by the students of the NIEROP Academic Master.

The NIEROP NoE Project finalized on April 2007, but the Educational Program on Enterprise Interoperability will continue through the NIEROP-VLab. NIEROP-VLab consists in the establishment of a permanent, self-sustained, high quality research organization in the enterprise interoperability (EI) domain that, capitalising on the results of NIEROP and the other clustered projects, will achieve and maintain the integration of European research capacities to tackle the basic problem of European research resource fragmentation.

One of the missions of the NIEROP-VLab is the development of Education and Training in order to promote and support initiatives for the establishment and the continuous support of European higher education initiatives. The objectives pursued within the Education and Training Programme of the NIEROP-VLab are: a) High level research programmes with high level PhD Dissertations in this domain and so to obtain research results at the international level; b) High level training curricula at all levels: academic and professional, at the international level; this point is crucial due to the high number of persons who are not educated in this

domain in the enterprise despite the fact that they must resolve interoperability problems on a daily basis. c) Effective communication and dissemination process for all the educational activities in this domain in Europe and other countries.

References

- [1] Clark R. Putting Learning Standards into Practice. ASID E-learning Handbook Mj. McGraw Hill 2002.
- [2] Garlasu D, Dumitrache J, Mihal A. A new approach for e-learning in collaborative networks[C]. Proc. of 6th Conference on Virtual Enterprises: Collaborative Networks and Their Breeding Environments, 2005. 243—248.
- [3] Georgiev T, Georgieva E, Snrikarov A. M-Learning— a New Stage of E-Learning[C]. Paper presented at International Conference on Computer Systems and Technologies— CompSysTech 2004. Rousse, Bulgaria 2004.
- [4] Greitzer F L, Rice D M, EATON S L, et al. A Cognitive Approach to e-Learning[C]. In Proceedings of the Inter-service/ Industry Training Simulation and Education Conference (V IISEC), Orlando, Florida 2003.
- [5] Greitzer F L. A cognitive approach to student centered e-Learning[C]. Proceedings Human Factors and Ergonomics Society 46th Annual Meeting, Baltimore, Maryland, USA 2002. 2064—2068.
- [6] Keller J. Motivational Design of Instruction[C]. In Reigeluth C (Ed.). Instructional design theories and models: an overview of their current status. Mahwah, NJ: Lawrence Erlbaum, 1983.
- [7] Poler R, Torno G. Business Process Integration, Knowledge Management and Decision Support Tools in Supply Chain of Industrial SMEs[C]. CONEX 14th November 2003.
- [8] Poler R. Deliverable D10.3 Training courses on Interoperability[C]. IST— 1— 508014: Interoperability Research for Networked Enterprises Applications and Software (NIEROP). Retrieved March 2, 2007, from http://interop.no.ee.org/backoffice/deliv/D10_3/.
- [9] Quinn C N. Making It Matter to the Learner: eMotional e-Learning[C]. Practical Applications of Technology for Learning. Retrieved January 13, 2007, from http://www.quinnovation.com/eMotional_eLearning_Pdf.
- [10] Simmons D E. The forum report: E-learning adoption rates and barriers[C]. In A. Rossett Ed. The ASID e-learning handbook. New York: McGraw-Hill 2002. 19—23.