

Building Efficient E-Learning Environment for Supporting the Promotion of Lifelong Learning and Knowledge Acquisition

TANJA ARH, MATIJA PIPAN, BORKA JERMAN BLAŽIČ

Laboratory for Open Systems and Networks

Jožef Stefan Institute

Jamova 39, 1000 Ljubljana

SLOVENIA

<http://www.e5.ijs.si>

Abstract: The paper describes an approach to the development of e-learning environment used within the Phare 2003 – Economic and Social Cohesion – Lifelong learning programme aimed at increasing the management proficiency levels in medium and small size enterprises through improvement of their knowledge and skills required for e-business applications. The paper begins with the description of the identified structural problems of Slovenian regions, continues with the description of e-learning model, based on blended learning methodology and e-learning environment structure used. Finally, the paper goes into details of design principles and approach of e-learning process performance and ends with a discussion of the overall results and conclusion remarks. The project was part of the Phare 2003 Lifelong program, funded by EU Commission.

Key-Words: e-learning, e-learning environment, course design, e-learning resources, e-business courses

1 Introduction

The project titled »Creating innovative learning environment, e-skills and competences development for supporting the promotion of Informal education in Lifelong Learning« or in short E-VINTER was launched after the call for proposals of the Phare 2003 – Economic and Social Cohesion – Lifelong learning programme for the Slovenian regions in the fall of 2004. The previous findings of several projects [1] have shown that several Slovenian regions need restructuring of the industrial sector and enhancement of the technology development and usage. That was evident also from the identified structural problems that make the Slovene economy and especially small and medium size companies less competitive and not well prepared to work the common European market. The main problems identified so far were: average productivity considerably below the EU level, unfavourable structure of Slovene manufacturing exports, low share of innovative and knowledge based companies, non-tradable service sectors lagging behind in restructuring and inability of companies to secure competitive advantages that are not price related. From the point of view of employment situation and demographics studies, the labour market is faced with several problems such as: long-term unemployment, low educational attainment of unemployed persons, low level of functional literacy, high rate of youth unemployment, and local and regional imbalances in unemployment. These problems in the industrial sector and the labour market are especially present in the Drava-Mura Region where the following was identified: industry in this

region is lacking competitiveness, weak level of entrepreneurship is present, there is a lack of restructuring efforts, the current industry is labour intensive, the levels of business and managerial know-how is rather weak. The SMEs sector is undeveloped and there is a big shortage of adequate business support institutions or information systems. The labour market in the region shows high level of unemployment (particularly among the youth) and low level of educational attainment. Educational and training institutions are slowly taking approaches to meet modern market needs, there is also lack of business and managerial know-how.

The call of »Phare 2003 - Economic and Social Cohesion – Lifelong learning programme« was addressing and tackling all these issues and was especially encouraging projects with e-learning and educational content. The E-VINTER project was aimed to overcome the current situation in the Drava-Mura region through introduction of web-based education and training in subjects relevant for unemployed people and SMEs trying to enter the new paradigm of doing e-business.

The E-VINTER project partnership was established at two levels. Within the framework of the core partnership where research-developmental institutions in the field of information technologies cooperate (Laboratory for Open Systems and Networks at Jožef Stefan Institute, Faculty of Electrical Engineering and Computer Science and SETCCE), and developmental institution in the field of occupational education (National Institute for Vocational Education and

Training). The second level of the partnership represents the associated partnership, which includes Employment service of Slovenia, Regional office Maribor, and Chamber of Commerce and Industry of Slovenia, Information Technology Centre, which enable contact with the user – region.

In the next chapter the approaches used are described in more details. The e-learning environment development and creating on-line material are presented as well as the current experiences.

2 General approach and methodology

E-VINTER project is building its approach through the co-ordinated network activities basically oriented towards offering exchange of knowledge on best-practice in e-business. This is mainly performed by the provision of web-based education, e-learning material with contents important for information and communication technology (ICT) skills development such as: networking, security in e-business and e-commerce, e-transaction and e-services, digital signature technologies and applications, law and legislation environment in the e-business paradigm. The training within E-VINTER project was performed through use of Virtual Learning Environment (VLE), also known as Learning Management System (LMS) or learning platform. LMS is software that automates the administration of training events and supports the management of learning in an organization [2, 6, 9]. All LMSs manage the log-in of registered users, manage course catalogs, record data from learners, and provide reports to management. LMSs are systems that support the creation (via authoring tools), storage (for example in a relational database) and presentation (often via a web browser) of learning materials in a structured way. They often include ‘tracking’ tools that allow for record-keeping on students enrolled in courses, and usage statistics for the system as a whole (one of the most important of these being statistical analysis of students’ responses to questions, which enables validation of testing on the system). An LMS enables us to develop electronic learning materials and courses for students, to offer these courses electronically to students, to test and evaluate the students electronically, and to generate electronically student databases in which student results and progress can be charted.

2.1 Target group

On the basis of recent analysis and research, E-VINTER project implements the basic strategy of the »Phare 2003 - Economic and Social Cohesion – Lifelong learning programme« which is to raise the level of lifelong

learning culture in less developed Slovenian regions by assuring quality, relevancy and accessibility of e-learning and training as key elements of life-long learning policy, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective. Therefore, the Drava-Mura region SMEs and unemployed people were invited to join the E-VINTER activities.



Fig. 1: The E-VINTER project web page

It has been expected that this type of involvement in getting e-business skills required for the new economic paradigm would improve the level of qualification, the necessary knowledge for further deployment and usage of the e-services and other information society technology. In the same time it has been expected this would parallel contribute to the upgrading of the level of business oriented service in SMEs. The applied method of education has been expected as well to introduce better understanding of the new methods of work in the spirit of the knowledge economy being developed in EU. For these reasons selection criteria for the target groups of trainee were very carefully set up and implemented. The region potential was weighted as well as the applicability of the level of knowledge to particular member of the target group. The selection criteria were:

- the potential of SMEs to enhance the usage of e-business tools and technology in the Drava-Mura region;
- the willingness of the SMEs to consider joint projects with other actors;
- age of the trainee, background and willingness to cooperate and work in group,
- readiness to use Internet tools and technology and to share information via ICT facilities,
- potential of having an broadband access to Internet services.

2.2 E-learning model

E-learning courses used in E-VINTER project combine the most effective traditional teaching methods with new information technologies. E-learning model is based on blended learning methodology, which allows building the efficient combinations of traditional and new methods of learning and training. The major principles of e-learning model used in E-VINTER project are [11]:

- combination of face-to-face learning and e-learning (6 face-to-face sessions in a course);
- combination self-learning and interactivity learning (active role of students);
- course (90-ours) is built by module system and uniform structural model;
- full learning and instructional support.

To organize the learning process, the e-learning environment has been developed. The model of e-learning environment is presented on Fig. 2. For the high effectiveness of educational process the e-learning environment is taking into account both pedagogical principles and ICT possibilities. E-learning environment could change the process of learning *from a passive to an active one*, encouraging regular communication between learners and with tutors. It takes the synchronous and asynchronous collaboration capabilities of the Internet and integrates them within tools that mirror the instructional process.

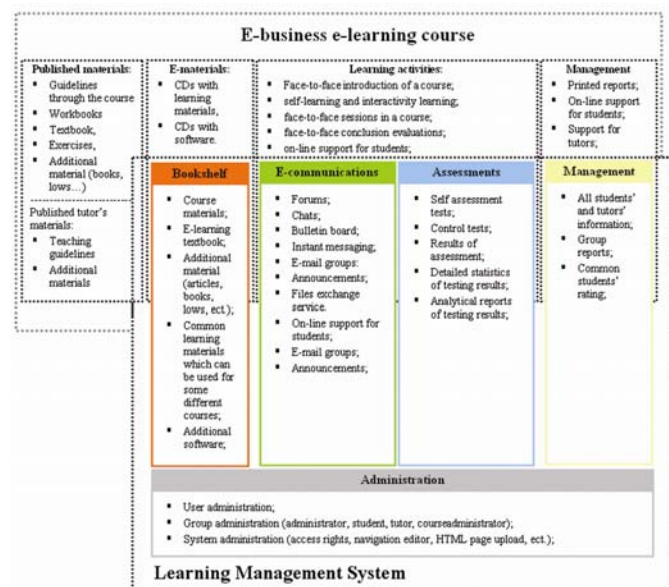


Fig. 2: The e-learning environment

2.2.1 The e-learning environment and its customisation

To create an effective and appropriate online learning environment for our define target group, we consider a few practical and pedagogical issues, including the

recognition of prior learning, self-assessment, diagnostic tests, the online roles of tutor and student, the best type of support technology tools to use, and the process of collaboration. It is also important to consider how e-learning materials will be distributed to the students, how students will be assessed, and how specialized software will be incorporated into the learning environment. These practical and pedagogical aspects are presented in more detail below.

• Reception

Learners have different backgrounds and different needs. At the beginning of the course students needs to establish goals, become aware of their own needs and grasp the objectives of each course.

• Roles

The tutor must accept the role of facilitator (as opposed to leader) in the learning process. This change requires moving from the “chalk-and-talk” role to a “guide-on-the-side” role. It is also important that tutors realize that e-learning requires high motivation on the part of the students.

• Support technology

Students must have access to a standard web browser, Internet connection and username and password of the e-learning environment.

• Collaboration tools

Effective collaboration between the tutor and students is crucial. Tutors must be familiar with the many Internet technologies that support effective communication and collaboration, including e-mail, group discussion lists, text-based chat facilities, and even videoconferencing.

• Material distribution

Developed e-learning environment provides a platform for delivering not only the text materials, but also the multimedia requirements as well, including audio and video streams of tutors lectures. Tutors must be familiar with the strengths and weaknesses of current technologies.

• Methodology

Flexible learning is not a question of telling students to do whatever they want, whenever they want to, as some teachers fear. Flexible learning is about providing individual students with the kind of material, tutoring and guidance that suits those best [5].

• Student assessment

Computer-based testing can provide instant feedback on student comprehension of course materials. But this type of managed testing can't work unless tutors accept assignments and provide feedback to students electronically.

• Specialized software

In some cases, course content might dictate that specialized tools be used to improve course comprehension and communication. For example, collaborative tools are now available that support shared

workspaces along with application-sharing capabilities across the Internet.

The training within E-VINTER project was performed through use of CLIX (www.clix.e-vinter.org) e-learning environment, that makes the training process of SMEs employees and other trainees “to go digital” automatically as the training is performed by use of web based learning resources customised to the targeted trained groups. CLIX [8] was customized to define target group needs and practical and pedagogical aspects mentioned above in the previous section.

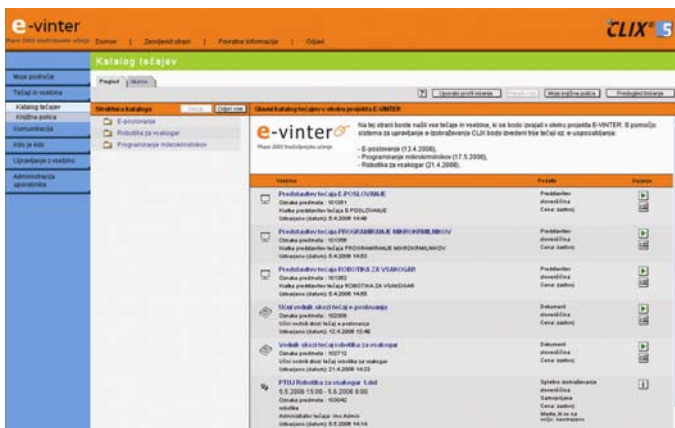


Fig. 3: Customized CLIX e-learning environment

2.3 E-learning material development

Developing learning resources is considered as the most important step in creating online learning environments. This is reflected in the resulting materials which often have dependable content-focus [3]. It is estimated that on-line tutors or mentors spend 90% of their on-line learning for the development of content and preparation of the resources. Contemporary approaches and analysis of the process suggests that the content can, and should, assume a far lesser role in the design process of the e-learning process. However, it is argued that learners need to be exposed to content that provides them with perspectives from a multitude of sources and this requires even more time to be fulfilled [7].

The quality of on-line learning resources development is the one of main factors of success. It is very important that all learning resources for all courses in the E-VINTER project were designed according to *uniform structural format*. Such format allows learning resources to be used independently on VLE or LMS, Internet access and may be allocated to CD. Main principles for development of on-line textbook [10]:

- Uniform structural format;
- Modular Approach;
- Hypertext and Hypermedia Combination;
- Pedagogical Usability Interface Design;

- Multidimensional Structured Content.

The *uniform structural format* allows experts and instructional designers to development e-materials. As an aid for developers, the special E-VINTER templates were prepared. Such structural format also provides students with their good orientation in the e-learning material. *Modular approach* allows course units to be used independently or in any combination. *Multimedia* also allows visualizing content makes it more interactively and offers to radically enhance the effectiveness of learning resources [4]. *Usability* is very important in e-learning. Lack of consideration for usability principles could damage the work of developers. Conception of *pedagogical web-design* allows developing e-learning materials simple and comprehensible in usage, fast accessible and attractive for study. The key issues for usability are: navigation, color combination, file size, graphic, icons, ect. The example of on modular approach is presented in Fig. 4.

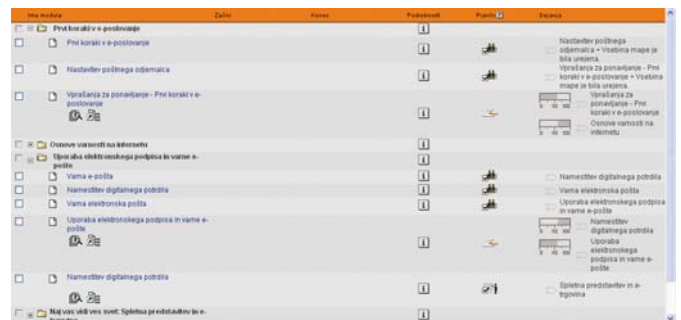


Fig. 4: Example of on-line learning resource

In the project special attention was paid to the preparation and building up of the E-VINTER catalogue of learning material as the project had targeted audience. It has been, namely, well recognized and understood, that effective educational material animates and activates the trainee. In our case this effectiveness has been achieved with the usage of multimedia on-line interactivities like simulation of real e-services (usage of eAccount, eTax, eBanking, ePurchasing ect.), on-line tests, discussion groups, video inputs. We have combined all media forms like text, audio, video, screen grabbing and annotations for the learning resources and the content provided. Advanced and innovative tools in the field of preparation learning resources have been used. These multimedia tools supports and enables:

- creation of multimedia presentations supported by known pedagogical models, systems helping the trainee to perform some e-business service on a virtual server,
- importing timeline snap points from an external source,
- embedding presentations in HTML iFrames,

- easily capturing and synchronizing audio and video with slides from our MS PowerPoint presentations.

The examples of e-learning resources are presented in Fig. 5.

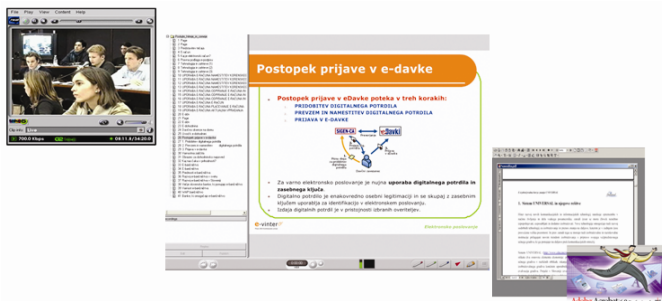


Fig. 5: Examples of on-line learning resource

3 Performance

The E-VINTER portfolio of activities was based on the analysis and the selection of the critical mass of the selected SMEs and unemployed people in the target groups and the number of training activities and courses selected by particular members. Crucial point was the setting up of the relevant e-learning environment and the corresponding networking enabling efficient training and transfer of knowledge and technology. For this reason promotional activities were performed to get the relevant community and to identify their special interest and needs. In this context special attention was given to the access possibility of the trainee regarding Internet and web services, cost of the Internet access and telecommunication was taken in account as well. In some cases the necessary provision of the access possibilities were provided at the University of Maribor without any charge. Mix of on-line and off-line channels were used as well: e-mail campaigns, media, dedicated sessions in the region, close links with multipliers and other key players, all in close cooperation with the Employment service of Slovenia and Regional office Maribor.

After the target group formation a network of SMEs attendees was set up with distribution list, data base of the members, dissemination facilities, contact points, etc. The training started with introductory seminars (introduction to CLIX e-learning environment, properties, access control, identification and authorization, delivery of learning material, usage of management learning tools) and courses with topics such as: e-business (what is this, how it works), privacy and security in e-business, microcontroller programming with the use of virtual laboratory, ect.

The required level of basic knowledge was achieved with workshops in the site itself with tutors and accompanying material. Special lessons were given about the usage of CLIX e-learning environment. This was followed by selection of appropriate e-learning resources (courses, textbooks, seminars, recorded lectures). E-VINTER catalogue of e-learning material on CLIX was prepared as multimedia web-based material. The students and trainees were followed through the chat room and mailing list. Special on-line tests were being developed required to be correctly filled out by the trainees. Meeting with trainees are organized each month enabling face-to-face contact between students and tutors. The meetings enable clearing up procedures to be implemented and problems and issues to be discussed.

4 General findings

Rapid information technological growth and advance in network communications have contributed to the increasing use of the Internet in e-learning and training. It has great potential for knowledge dissemination, effective learning, and efficient education services. The balance combination of didactical and technological approaches that are integrated in common e-learning environment provides efficiency and effectiveness of e-learning implementation. The activities in e-learning and training implemented within the Phare 2003 Lifelong learning project E-VINTER in the Drava-Mura region were based on:

- usage of new concepts in e-learning by implementing e-business approach providing enhanced intelligence and functionality in the learning process,
- usage of the CLIX e-learning environment capability allowing a reduction in capital and operational expenditures for the SMEs and unemployed people,
- usage of standardized solutions enabling low end user cost and access network equipment and
- consolidated European approach to technology, systems and services in the field of e-services.

The activities within E-VINTER project have shown that this type of web-based education is good approach in solving some special economic problems in the Drava-Mura region. The responses from the SMEs and unemployed people were very good. Besides training and transfer of knowledge through use of ICT advanced tools brought additional benefit. It contributes to formation of on-line *Partnering Network (PN)*. The Partnering Network set up within E-VINTER project is much more than a reactive search and match web facility. The project partners and target group members

directly assist interested parties to form consortia. The Partnering Networks is created by an active recruitment and includes representative of going digital projects, IST participating organizations, SMEs and other organizations interested to start collaborative projects. Besides the network the E-VINTER project is a platform for delivering success stories: a blended e-learning approach proves that such e-initiatives have lasting results.

5 Conclusion

E-VINTER is one of the first projects in the region that tries to overcome the existing deficiencies in the labour market and the current economy. The development of the e-learning environment and e-learning educational material required special approaches and preparation of the whole activities, as the project intention is to learn about ICT non knowledgeable users with tools used and developed in ICT applications such as secure e-business and e-commerce. The first results are encouraging and it is expected the e-learning environment and on-line learning material to be part of long-term sustainable offering of distance learning for interested region.

Namely, all Slovenian regions must prove that dynamic economic growth can be achieved simultaneously with the enhancement of the lifelong learning concept. Emphasizing the standpoint, according to which "people are Europe's main asset and should be the focal point of the Union's policies" it can be deduced that primarily the education and training systems must adjust to changes accompanying the new 21st century and that lifelong learning is an essential policy for the development of citizenship, social cohesion and employment.

References:

- [1] Austria – Slovenia, Interreg IIIA Phare CBC, *Joint Programming Document 2000 – 2006*, Reworked Version in Accordance with the Results of the Negotiations from 11th and 12th October 2000, Working document.
- [2] Dean, C, *Technology based training & on-line learning: An overview of authoring systems and learning management systems available in UK*, 2002. Retrieved online November 15, 2005, from: <http://www.peak.co.uk/AuthoringSystem.pdf>
- [3] Dehoney, J., Reeves, T., Instructional and social dimensions of class web pages, *Journal of Computing in Higher Education*, 10 (2), pp. 19–41, 1999.
- [4] Fahy, P. J., Media characteristics and online learning technology. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning*, Athabasca, AB: Athabasca University, 2004, pp. 137–174.
- [5] Gibbs, G, et al. *Institutional Support for Resource Based Learning*, Oxford, UK, 1994.
- [6] Hall, B., *New Technology Definitions*, retrieved online August 5, 2003, from <http://www.brandonhall.com/public/glossary/index.htm>
- [7] Herrington, J., Oliver, R., The critical elements of situated learning environments. J. Pearce, A. Ellis (Eds), *Learning with Technology, ASCILITE'95 Conference Proceedings*, pp. 395–403, Melbourne: ASCILITE, 1995.
- [8] imc. Advanced Learning Solutions. <http://www.imc.de>, 2005.
- [9] Kaplan, E, *E-learning Glossary*, retrieved online November 15, 2005, from: <http://www.learningcircuits.org/glossary.html>
- [10] Zhuralova, I., Multidimensionality and nonlinearity in hypermedia distance learning courses, *Proceedings of IADIS International Conference Cognition and Exploratory Learning in Digital AGE (CELDA, 2004)*, Lisbon, Portugal, 2004, pp. 479–482.
- [11] Zhuravlova, I., Development of Distance Learning Courses: Integrated Approach. *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA 2004)*. Lugano, Switzerland, Vol. 1, 2004, 462–468.