LifeLong Learning for Small and Medium Companies in Serbia

Mirjana Ivanović[1], Zoran Budimac[1], Zvonimir Dudan[2]

[1]Faculty of Science, Department of Mathematics and Informatics, 4 Trg D. Obradovića, Novi Sad, Serbia, {mira, zjb}@im.ns.ac.yu

[2]Unisys, Bakers Court, Uxbridge, Middlesex UB8 1RG, UK, zdudan@gmail.com

Developing skills in information and communications technology (ICT) is a particular priority in modern societies, but it is almost must in less developed countries. Also, training and learning are more and more considered as competitive advantages in the business world, and there is need to raise technological and professional level. In this paper we will present an idea for organization of retraining for computer professionals in software companies and also in other small and medium enterprises in Serbia.

Keywords

Distance learning, Knowledge innovation, Lifelong learning, Skills development.

1. Introduction

The development and deployment of innovative ICT (Information and Communication Technologies) applications and services is becoming the key factor for growth and employment in all parts of Europe [1]. Especially in the area of South Eastern Europe and countries in transition (like Serbia) it has been reported that there is a clear need for linking university and higher education ICT curricula to the market demand for more skilled and practically educated software professionals. Developing skills in information and communications technology is a particular priority in many parts of Europe [2]. But, it is also important to introduce appropriate training system for employees of small and medium enterprises on different levels and ICT domains [3].

Until recent years, training was considered non-productive, but at present the level of knowledge inside companies can hardly keep up with the rapid changes in management and technology. Training and learning are more and more considered as competitive advantages in the business world. The traditional training policy cannot face all emerging needs, and the alignment of the strategy for knowledge transfer with corporate goals is essential to satisfy market constraints.

Before 2000 and democratic changes in Serbia, students in the domain of information technology and its business applications had a lot of problems: shortage of literature, lack of official versions of software, and difficulties with old equipment. After opening of the country, general situation in the whole society became much better, but still far from the situation in the developed part of European Union. Even bigger problem arises with employees in local companies, who finished their education earlier.

Foreign software companies entered Serbia need a lot of more knowledgeable and skilled professionals. Local companies use computers, information technologies and new business trends much more than before – therefore their need for educated ICT and business professionals is growing by the day. Still, “older” graduates have a problem of coping with the newest trends. Contemporary information technology, finance and investment, bigger

projects in different domains (especially supported by different software development processes) started to pour into Serbia with not too many people ready and prepared to accept them. Universities accepted the changes; University of Novi Sad developed different curricula in accordance with the Bologna declaration, European Credit Transfer System and newest European educational trends. Yet, this makes a gap between current and former students even greater.

New models of learning and training are needed in order to let companies cope with a continuous competence upgrading, the standardization of skills and the detection of skill gaps in the organizations. Companies must be able to plan training actions for groups of persons or project teams, and must offer workers new opportunities of self-improvement. Training can be organized by individuals whenever they identify a gap between their own expertise and work requirements; this can be accomplished by simply using an updating strategy.

The rest of the paper is organized as follows. In section 2 needs for retraining of employees are detected and discussed. Sections 3 and 4 present and discuss different aspects of implementation of lifelong learning in Serbia. Possible realization of presented idea of retraining employees and some expected results are considered in section 5. Section 6 concludes the paper.

2. Needs for Retraining of Employees in Small and Medium Enterprises

Some companies, getting aware of situation and need of improving professional qualifications of their employees, contacted the different faculties and ask to organize various training courses for improvement knowledge of their employees in the domain of: software processes and development of more qualitative software; e-business, m-business and distributed software applications; application of intelligent techniques, data mining and warehousing in development of information systems; finance and appropriate mathematical models; management in general and especially project management.

At the same time we are facing the possibility for both unemployment, and shortage of well skilled professionals in informatics and business. Independently of that, field of information technologies is known as field of rapid changes and the need for a lifelong learning is more stressed and demanding in this area than anywhere else.

According to the mentioned problems and challenges, some companies and individual employees expressed needs for retraining in emerging technologies. Most of employees personally feel that there are gaps between the types of skills they possess and those expected of them by their employers. As mentioned in [2] we also believe that self-assessments of this nature are vital if individuals are to be helped to engage in lifelong learning and upskilling in the context of their employment. Furthermore, it provides a rational framework for the selection of courses and training materials.

The selected users, which are important software companies in the region's economy and business, operated as important participants in starting phase for the needs analysis and assessment. The user organizations provided input concerning mostly their own needs. We also used a great experience gained during realization of TEMPUS project for creating Master studies in Software Engineering [4], and experiences that our partners have in their countries (UK, Spain, Germany, Romania, Bulgaria). Questionnaires were used as assessment techniques. Additionally, we used interviews as assessment technique complementary to the questionnaires we distributed. Interviews (in a semi-structured way) were appropriate for gaining user organizations' support, obtaining sensitive data, discussing complex issues that need further explanation, and asking follow-up questions [1].

One additional and also very important source of information about trends in ICT field was obtained from our former students employed in important companies all over the world. Through constant contacts (e-forums, e-communication,…) with our former students (employed in local companies and abroad: European countries, Canada and America), their practical experiences and business needs, we realized that their permanent knowledge innovation is primary needed and obligation.

After analysis of collected opinions from these valuable sources the following needs are detected, in fulfilling new business and economy requirements:

a) a need for education in certain areas of informatics, business and management, for former graduates, to raise their productivity;
b) a need to establish a firm and stable infrastructure that would enable lifelong, context-sensitive learning in many fields of ICT;
c) a need of ICT professionals to continue their formal education, and be included in master studies according to the Bologna processes;
d) a permanent need to have a close contact with the actual and authentic needs of the industry of the country and region.

2.1 Meet Short-term Needs

The needs a) and d) could be fulfilled by a short-term intervention. A certain number of retraining courses in emerging fields of ICT and business, or meetings of computer professionals in order to exchange experiences, know-how, problems, or needs, can be a very helpful “tools” to raise a level of competence of current ICT-professionals in Serbia. Satisfaction of those needs will help better understanding and easier development of appropriate environment for the needs b) and c).

At University level and environment, it will help in decisions and aims in the curricula development. At the business environment, it will help employees to become aware of the fields they need to be more involved with.

The continual need for retraining, knowledge transfer of software and computer professionals in Serbia in fields of informatics, business, and management will in short-term be met by twofold method.

First, face-to-face training would be organized for those who have a larger knowledge gaps.

Secondly, since distance education is an effective answer to this demand for flexibility in training, through web-based, distance learning, occasional meetings organized on regular bases, and constantly open forums, chats, and Query&Answer areas on the Internet, smaller cracks in knowledge can be fixed.

The domains for formal training will be determined through consultations with consortium members, based on their experiences with the similar problem, and trends in European business area.

After that, a need for lifelong and continual training could be fulfilled by the development of web-based infrastructure and occasional, per-need organized meetings. This blended approach guarantees a possibility for anytime/anywhere learning with satisfactory level of quality.

3. Origins of the Need for Lifelong Learning

The need for lifelong learning and training in conjunction with societal and economic factors such as the *lack of time*, the *lack of financial resources*, but also accommodation of the relatively *large number of people* to be trained, push for changes in what has been the traditional, class-based model in the learning and training process. Our efforts has the

strategic goal to set up an e-Learning service that will provide training courses that will build Information and Communication Technologies' skills and competences needed for the implementation of the Information and knowledge-based society in Serbia and also to launch network with other countries in the region of Balkan and the rest of Europe (similar intention can be found in [1]). Identification of training needs and appropriate topics and courses is crucial for the success of the whole effort.

As it has been widely accepted, needs assessment sets the stage for effective training [5]. Needs assessment would crucially determine our e-learning strategy that should support the design process and address the following [1]:

- A common business language and vision to describe the web-based courses that will be delivered.
- Creation of content that make learning/training compelling, engaging and relevant to target audience needs.
- Minimal support for individual learner profiles, including job/ role-based competencies, interests and long-term career goals.

The basic assumption is to combine the dual perspectives of content (person, task, organizational) and levels (individual, subunit and organizational). This systematic approach (including organizational dimension) is essential, since the e-learning intervention for training purposes is a new experience for the user organizations in Serbia. The analysis which is based on information from different sources focused on determining and verifying the skills and competencies necessary to be trained in the early phase.

So, the need a) mentioned in section 2., is identified through the regular contacts that teaching staff of the University of Novi Sad has with their former students in computer science, both those working abroad and those working in Serbia. It had become obvious that the needs of both converge towards the necessity of additional education in certain modern technologies, business and management. Recently, former students working in Serbia, and their representatives of companies, started to specifically ask for the possibilities of continual retraining, additional education, and conformation of already acquired knowledge.

Investment in educational processes and raising the level of practical knowledge and skills of students and innovation of knowledge of employees is necessary pre-condition for more qualitative economical development of the whole society. Establishing knowledge transfer center for traditional and distance (online) learning is necessity for further more qualitative development of ICT professionals. Online education is growing rapidly because it provides learners opportunities to learn anywhere and anytime with access to the Internet [6].

Existence of distance (online) learning network in the region in the field of informatics, business and management is extremely important for companies and universities as well.

Furthermore it is necessary that Serbian universities improve and modernize educational infrastructure (modern tools and systems for e-learning and distance learning) and strengthen connections with regional companies, institutions and individuals.

4. Objectives of Lifelong Learning

The needs assessment process provides valuable input to the design process of appropriate courses and the development of the appropriate content in technology areas of common interest and the common gaps in skills and competencies. The courses have to address two broad areas of skills and competencies:

- Software & Applications Development, and application of emerging technologies
- ICT and Business Management

The respective tasks in the focus job area of Software and Applications Development are the following:

- Applying modern design methods and associated development tools.
- Applying modern technologies in software systems implementation (agents, mining, warehousing, intelligent techniques,…).
- Analyzing system routines/modules, performance, memory size, etc. of (embedded) technical and business systems (when applicable).
- Specifying user requirements and functional requirements.

Moreover, in the domain of ICT and Business, more emphasis should be put on the following tasks:

- Overseeing and coordinating information flow, data security, business recovery, system implementation, and change management
- Defining business requirements and logic for the IT solution
- Defining ICT strategy for the business (for instance, the best ways to capitalize on the latest internet or mobile phone technologies). Participating in business needs planning and strategy process.

Having in mind all that we recognize that it is necessary to propose, at the university level, particular specific service (in form of a project, as a starting point), which can cover different stages and goals of employees' and companies' long-term retraining needs. Wide objective of the service/project could be :

- To fill-in the gaps in knowledge, understanding, comprehension, and competencies of Serbian professionals in software and business environments, who had a misfortune to study earlier in much more difficult circumstances, and who live in a country that just recently started to really communicate with the rest of Europe.
- To ensure that the university and appropriate faculties are in a position to offer lifelong education this is targeted towards the changing needs of the economic environment. And which will influence whole educational structure in Serbia, especially in the domain of distance, lifelong learning. .
- As a by-product, it is expected that a web-based (online) environment in form of knowledge transfer center, will be created that will continue to live for many years, and help professionals in their need for self-improvement and lifelong learning.

As wide objectives of this initiative have to attract, recruit and organize a lot of different kind of university staff, financial sources and working time, we are not optimistic that it is possible to achieve in some short period in the future. In accordance to this and situation in local companies the best solution is to divide activities in several interconnected phases.

The first phase would be to organize specific courses in order to improve the qualifications of employees in local companies in the area of informatics, business and management. All together, optimal number of participants which will be trained in this phase is 100 professionals with informatics, economy, and/or electrical engineering background.

To fulfill wide objectives and long-term expectations and needs, definition of 10 unique courses, each lasting for two weeks (in consistence with Bologna declaration) for emerging informatics and business domains, will be enough. Those courses follow results of needs assessment and have to cover following emergent technologies and techniques: knowledge management, agent methodology, data mining and warehousing, intelligent decision systems; software engineering; financial mathematics in banking, stock-exchange, revision, modeling real-world systems; management in modern communication techniques; software project management,…

But, having in mind formal, financial, time and some other limitations that staff from university has and also tight work time and obligations of employees from companies, we decide to reduce number of courses to 5, in the first phase of retraining. As we also expect that significant number of employees will not be able to attend regular classes, appropriate e-forms and learning modules for distance education facilities have to be prepared and such kind of retraining has to be organized, in parallel.

Since master studies in software engineering have been created at University of Novi Sad [4], [7], [8] and first students enrolled last year, it could be useful to offer all (or most of) prepared courses as elective subjects in the current curricula.

After successful realization of the first phase of retraining it would be possible to start the second phase. This phase could be devoted to raise quality level of existing courses and also introduce another group of courses. Distribution of questionnaires for feed-back information, experience exchange and usability of delivered courses, are necessary activity and can help to improve existing courses materials and strengthened collaboration with local industry and companies.

Also, considering opinions and experiences of participants of the first phase (realized by questionnaires and interviews), trends in ICT and business domains, and needs of market all over the developed countries, selection of topics for new courses could be done. 10 different courses, which will be restructured, reorganized and innovated from time to time, is a good baseline for high quality knowledge transfer and cooperation between university and local/regional companies and industry.

The third and very important phase has to be establishment, at the University level, of a knowledge transfer center and a specific service for lifelong learning, for further retraining activities of employees in regional companies. It will help in raising skills and knowledge level of employees for better cooperation with other European regions and companies. Knowledge transfer center has to be formed as new organizational body of University. Knowledge center has to obtain retraining of at least 80 participants every year and has to implement the best characteristics of blended education: traditional face-to-face form and distance web-based form [9], [10].

During all of the mentioned phases special attention has to be paid to improvement of the cooperation among teaching staff of University of Novi Sad and other universities in the region (especially in South Eastern Europe countries). Also it could be very important to improve and deepener cooperation and communication with representatives of companies and employees involved in implementation of retraining process, in order to improve prepared courses and generally to advance professional skills and proficiency. Up to now we have some rudimental kind of cooperation with other universities in region (Croatia, Romania, Bulgaria, FYROM) [4], [8], which have similar problems and which try to set up connections with local companies. Make better and more qualitative connections must be obligation in achieving European market and business requirements.

5. Expected Results

Target group of retraining process are employees in companies which are mostly involved in different stages of software development (design, requirement analysis, software development, testing, maintenance, project management) for different purposes (insurance companies, business, accounting, different financial transactions, banking,…). Employees are on diverse positions in companies, with various working experience and with different background education: computer professionals, engineers, mathematicians, economists. But all of them feel that need retraining in order to gain new knowledge and better skills.

Up to now we analyze the results of employees' needs assessment and detected and defined teaching material for 10 different courses, in accordance to European higher education standards and market requirements. Also we selected 5 most interesting and important for realization of the first phase of retraining: Financial mathematics and applications in economy; Advances in databases and information systems; Agent methodologies in business environment; Web systems, Knowledge management; e-business and m-business.

Other interesting topics for developing new courses, for the second phase of retraining, are also observed, considered and include: Economical needs in ICT in transition countries; Workflows and business logic; Organizational knowledge, Data mining and data warehousing; Intelligent techniques and systems in business; Management and software project management.

In cooperation with company representatives, 100 employees from important software developing companies are selected for the first phase of retraining in newest, emerging ICT, business and management domains. They expect to acquire a lot of new specific competences necessary for more qualitative and productive professional life: understanding of necessity to apply new technologies and standards; development of more flexible and intelligent software with application of modern software formalisms; application of measurement techniques, security requirements and so on.

Concerning job and professional obligations of most of selected employees, the courses in the first phase has to be delivered in the following way: organization of face-to-face training courses for 70 employees, delivering teaching materials, organization of appropriate infrastructure for distance learning, and education for 30 more employees in distance learning way.

Representatives of key faculties introduced the idea of establishing new university service to university representatives: knowledge transfer center, with appropriate infrastructure for distance, lifelong learning. They agreed to try to find facilities and financial sources (through bilateral, regional, European funds and projects) necessary for implementation of basic components for distance learning system (authoring tools, learning management systems, systems for data exchange between trainees,…). It would be first step towards establishment of knowledge transfer center and integration of distance learning system for lifelong learning: social aspects of www communication, Internet newsgroups, pools, chat-rooms, video-(tele)conferencing.

6. Conclusion

Representatives of key faculties of the University of Novi Sad, representatives of most important software companies and other important small and medium enterprises in Serbia are strongly oriented towards realization of this innovative and very important idea, but some extra financial inputs and support are necessary for realization of all of three mentioned phases of retraining process. It is clear that full realization of retraining process has a lot of useful direct/indirect beneficiaries.

Direct benefits could be in accordance with trends in Europe and Serbia as well in the domain of lifelong learning:

- Prepared modern and up-to-date courses in different emerging informatics, business and management domains.
- Retraining of significant number of employees in leading companies in region.
- Raising the quality of knowledge of employees in the software development for business and economic purposes is good basis for more qualitative economical development and collaboration with European companies.
- Establishing knowledge transfer center and infrastructure for distance, lifelong education.

Indirect benefits could be:

- Good basis (courses and appropriate materials) for further retraining of new groups of employees.
- Establishment of the distance learning center is a good basis for better incorporation in European higher education area and distance learning communities.
- Better cooperation between Serbian and different software companies all over the world.
- Better and more qualitatively educated and more skilled employees can obtain more competitive software products.

Next phases of our work will include the development of web-based courses, the e-learning service setup and operation at University level. These activities however require additional, mostly financial support. After that some further activities could be connected to the evaluation framework for the e-learning service in the context of South-Eastern Europe.

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