Lifelong learning as a tool for updating technical knowledge

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Abstract

Skills and competencies acquired in university are rarely sufficient for a lifetime's work. While careers can last more than thirty years, skills often become obsolete within five. This is particularly true for technical professionals. Others, particularly those lacking higher education, have many barriers set in the way of obtaining further schooling; age limits are often set on support for these potential students.

At the same time, adults living in modern Europe do not have much time to devote to learning. Family and other personal obligations start to take priority, and balancing these with professional obligations can be overwhelming already, even before we consider possible academic pursuits.

Employers are looking for proficient and skilful workers. They cannot ignore the health and happiness of their workers, for without these attributes, workers cannot be fully proficient. The personal demands of the workers have to be balanced with the economic demands for training and education. Many employers have chosen to adopt a policy of emphasizing education and training that lasts throughout workers lives. We agree that lifelong learning is important given the context of today's rapidly developing technology and business practices in a global economy.

Our goal is to determine how we can organize workforce education, and make knowledge more approachable to women and people who live far from universities. We will also consider ways to help those who need to improve their technical knowledge late in their careers, and also to help those who have entered the workforce without higher education.

Keywords: Education, research, lifelong learning, training, adults, women, family

1. Background

1.1 Adult learner and life – long learning

"Adult learner" defined by the European Parliament, means a learner participating in adult education [1]. Life-long learning refers to persons aged 25 to 64 who stated that they received education or training. [2].

EU Commission to the Council – Adult learning published on October 2006 paper with the title," It is never late to learn". They wrote about lifelong learning and how important lifelong study is for economic competitiveness, demographic change, poverty and social exclusion. Also they showed types of actions needed. By the end of 2007, the Commission intends to draw up an action plan based on the experience gained from the Socrates and Grundtvig programs [3].

1.2 New countries in EU – position and work condition

The EU numbers 27 countries [4]. In 2004 the European Union accepted ten countries (Cyprus, Malta, Slovakia, Slovenia, Poland, Hungary, the Czech Republic, Latvia, Lithuania, and Estonia), Romania and Bulgaria joined in 2007. All new EU countries had been in a new position. Ten countries, excluding Cyprus and Malta, come from a socialist system. From 1998 to 2004 the EU economy was in a new transition and they accommodated to new market in EU. This period registered big progress and good impulsion to start in the EU.

Now is 2007. Many companies have had extensive experience in marketing, lots of new knowledge and have good experts. They have worked and made contact with many experts everywhere in the EU. For further progress they need a good education and the possibility to acquire new knowledge. Technical knowledge and high technical profession experts are wanted because this kind of people are lacking. Why? In fact, technical knowledge is not as popular as other knowledge like law or economy. All around the world the situation is similar and in the last few years many governments strive to make these fields of knowledge more popular. Other reasons are work conditions. It is not just indoor work, mostly outdoor work under bad or good weather conditions (civil and mechanical engineers) and under extreme workplace conditions (mining engineers). People in technical fields mostly work ten and more hours per day and if they don't have degree education, they very hard to take it, especially if live on part of Europe from 12 new countries after 2004.

1.3 Courses in University

Most universities in the EU offer fixed programs, which proofed by government before they are implemented. Universities do not have options to prepare something interesting every year, because it takes too much time and too many people to develop new programs.

Undergraduate program last 180 ECTS (1 ECTS is to Bologna Declaration about 25-30 hours which included lectures, personal work [5]). Most of programs are designated for a population that does not have work obligations, family obligations and so on. Undergraduate programs consisting of 180 ECTS is about 5400 hours. If one spends 3 hours per day for study, one can study 90 hours per month. In this situation study is last 6 years.

1.4 Why are high degrees not good for adult learner

Across the EU the work week averages 35 to 42 hours. We work Monday to Friday. Saturday and Sunday we have free. In this days family take priority.

In Slovenia, we work from 8 a.m. to 5 p.m. A lot of people spend more then one hour per day commuting. If we add that together it amounts to 11 hours per day. Average required time to sleep is six to nine hours per day [6]. For family, hobbies and personal activities this theoretically leaves six hours per day free (Figure 1).

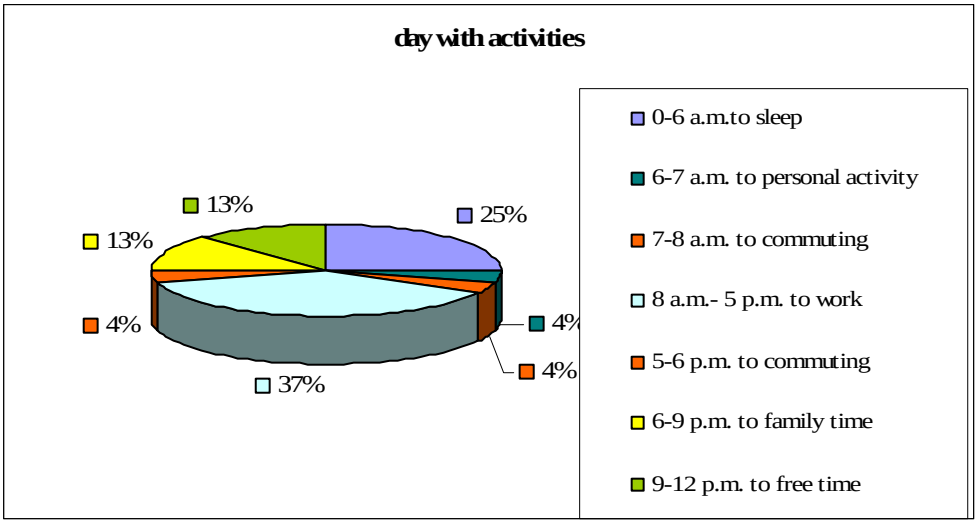

Figure 1: activities in on day

Technological development and technical knowledge requires continual education for people who work. The progress of computer tools advanced much in the last 15 years. The knowledge of new standards and legislations are required to be competitive. This is very difficult also for people with higher education, who in average are 40 years old.

What are the differences between men and women in the workplace? They do not exist as far as employers are concerned. But as a matter of fact differences exist and are large. Women bare children, they become pregnant (including all complications) and children need maternal care, especially in the first 3 years. Women get paid less for the same education and have a worse workplace environment than men. Women often have difficulty juggling their professional and family lives.

2. New solutions

If we look around universities in EU we can see universities in England and some universities in other parts of Europe offering short and summer courses in technical fields. They are designed for people, who want education and new knowledge during their life time careers. They also offer distance learning or e-learning programs.

For all of these activities special programs at universities are designated with titles "Centre for education and professional skills" or "Life-long learning education" or "Learning through work" amongst other titles. There are employees who maintain all of it education and professional development specialists.

2.1 Distance and e-learning is a good solution for adult learners

Some universities offer distance learning with e-learning tutorial hours and in the past more popular e-learning. Both of them are suitable for use in work place, because they don't need to go to a university. Through distance learning one can study at any time, but in a fixed time with e-learning. In addition, Klinc (2007) warned of problems during the e-learning course ITC Euromaster (9 universities over the World). On a survey question "Did you experience any problems during the course?" 86 % students answered Yes [7]. In fact e-learning is not completely developed, but the distance approach to education offers numerous benefits:

1. Accommodates different learning styles and schedules
2. Uses various educational resources or media (paper, video, audio, online) as instructional tools
3. Allows use of multiple communication methods (e-mail, teleconference, video conference, instant messaging)
4. Supports self-directed and self-paced learning style and methods

Many students choose this type of education because full-time jobs, physical limitations, or other commitments prevent their participation in the more traditional approaches to instruction.

The other form of distance education, often called hybrid, supplements traditional classroom instruction with online resources. The instructors deliver classroom lectures, but homework, assignments, and supplemental material may be retrieved online.

New computer technology made virtual worlds that are beginning to change higher education. Companies are developing tools to help universities better manage students and courses delivered in cyberspace, the trendy three-dimensional online world called »Second Life« [8]. Second Life has recently become one of the cutting-edge virtual classrooms for major colleges and universities, including 22 partners from USA, UK, Australia and Israel. Second Life fosters a welcoming atmosphere for administrators to host lectures and projects online, selling more than 100 islands for educational purposes, according to a New York Times article. Rebecca Nesson, an instructor at Harvard who brought her Legal Studies class to Second Life in the second half of 2006 said: "Normally, no matter how good a distance-learning class is, an inherent distance does still exist between you and your students. Second Life has really bridged that gap. There is just more unofficial time that we spend together outside of the typical class session." [9].

The more important information is how students overcome the technical and interface difficulties with Second Life? How is this way of education suitable for adult learners? We know that the group “Adult learner” is not a “Net Generation” (a group that has never known a world without computers and the Internet). Is the Second Life a suitable educational way in all professionals?

Learning through the media is important, especially for workforce people, but nothing can substitute for the experience of hearing, talking to and building a relationship with a real person

from another culture. The purpose of using the latest communications technology is to expand student's communications skills, enhance fundamental goals of education, including critical thinking and problem solving.

With all the technical progress, faculties and instructors will find the learning styles oriented towards teamwork, experiential activities, and the use of technology such a online discussions or simulations.

But in spite of this, in the next 5-10 years, distance learning and e-learning will be a good option for adult learners.

2.2 Fees and financial situation in Europe

Some universities will be providing online professional development courses at varying prices, depending on the provider and the nature of the course. As with credit, this is an important question to ask prior to enrolling in an online professional development course. Credits for online courses are often charged at the same rate as credits for traditional courses.

For a good education you often need a lot of money. The fees are not low. On university web sites, we can find this data:

- 1100 £per 60 credits at Level M at the University of Cambridge (UK),
- 180 £ per one online course at the University of Oxford (UK)
- 674 £ per Day and Weekend Day or Evening Classes for Professional Development in University of Oxford (UK)
- 895 £ for 3-4 days short course, 18.500 £ per undergraduate degree and 4.240 per postgraduate degree at the Imperial College in London (UK)
- 8.380 £-10.920 £ per undergraduate degree and 7.500 £+ per postgraduate degree at Herriot Watt University (UK)

And some universities across Europe:

- 2660 CHF for two years of part time or one year full time study in MAS ETH in Zurich (CH),
- 2800 CHF for a block course (200 hour split 2 year) in MAS ETH in Zurich (CH),
- 895 Euro for 3 days short course in Tehnishe University in Graz (A),
- 1000 Euro per year for a undergraduate degree at TU in Munich (D),
- 1500 Euro per year per undergraduate study and 1800 per year per postgraduate study at the University of Maribor – Faculty of Civil Engineering (SLO).

In the 27 European countries there are 268 regions [10]. We have big differences between the highest and lowest regions ranged. If the average GDP expressed in terms of purchasing power standards (PPS) European data is 100 %. In table 1 show how high is PPS in 10 regions in Europe Union.

Table 1: GDP data expressed in terms of PPS in % - the five higher and five lowest regions over Europe

Region (Country)	PPS in %	Region (Country)	PPS in %
Inner London (UK)	**303**	**Sud - Muntenia (RO)**	28
Luxembourg (LU)	251	**Severen tsentralen (BG)**	26
Bruxelles-Cap. (BE)	248	**Yuzhen tsentralen (BG)**	26
Hamburg (DE)	195	**Severozapaden (BG)**	26
Wien (AT)	180	**Nord - Est (RO)**	**24**

In fact, for many people from countries with low PPS (purchasing power standards) areas in Europe, studies in other countries, with good faculty and good programs are too expensive and unattainable.

2.3 Degree education inaccessible to adult learner

More and more adult learners are finding the convenience and flexibility of online learning to be a good match for their learning goals and busy lifestyles.

Right now there is a strong demand for online studies. Most degree programs in technical fields at the universities or faculties are not suitable for adult learning working people between 25 and 64 years of age. In a degree program, it is not possible to choose individual subprograms and work on them at ones own pace and time.

2.4 What are the reasons for insufficient offering of programs

Why don't the universities or the faculties in technical fields offer more degree programs for adult learners? What are the reasons? Is basic knowledge like math and physics a great difficulty for adult learners? What about the popularity of technical knowledge? Do industries not require formal education? Are they satisfied with workers who learn in the workplace from other degree educated colleagues? What is the relation between universities and employers? Are they integrated?

We live in a time of revolutionary change. Not only is the world relying increasingly on technology for economic growth and job development, but the countries are making the difficult transition of refocusing a significant amount of its technology investment from national security to international economic competitiveness. Engineers play an ever more significant role. They develop new manufacturing processes and products; create and manage energy, transportation and communications systems; prevent new and readdress old environmental problems; in

general, make technology work. For all of this, they need specific technical skills, economy, law, management, medicine, etc. These professions require analytical and problem solving abilities, all of which are part of an engineering education.

Engineering colleges who working in companies must not only provide their graduates with intellectual development and superb technical capabilities, but following industry's lead, those colleges must educate their »no formal education colleagues« or students to work as part of teams, communicate well, and understand the economic, social, environmental and international context of their professional activities. Engineering education programs must attract an ethnic and social diversity of students. Not only does the engineering profession require a spectrum of skills and backgrounds, but it should preserve its historical role as a profession of upward mobility.

Engineering education will be most effective if implemented with the aid of all sectors of the community; and programs must not only teach the fundamentals of engineering theory, experimentation and practice, but be relevant, attractive and connected:

- relevant to the lives and careers of students, preparing them for a broad range of careers, as well as for lifelong learning involving both formal programs and hands-on experience;
- attractive so that the excitement and intellectual content of engineering will attract highly talented students with a wider variety of backgrounds and career interests, particularly women, underrepresented minorities and the disabled, and will empower them to succeed; and
- connected to the needs and issues of the broader community through integrated activities with other parts of the educational system, industry and government [11].

Engineering deans are principally responsible for leading engineering education, they work in partnership with their faculties, secondary schools, the broader university, government and chambers, other engineering colleges, and build even closer ties to industry. These sectors make up the broad constituency of engineering education.

Many universities and their engineering colleges aspired to the model of the "research-intensive" university. This model focused on developing research excellence in scientific and engineering fields, and on creating research-oriented doctoral degrees. Are we in need of this model in all levels and all professinal programs, as well as programs for adult learners?

The world now demands new models. Progress communications technologies are enabling engineering schools to expand their reach and accessibility, and to experiment with alternate modes of teaching and learning.

A variety of models in engineering education will result from the process of schools reexamining their individual missions.For example, some colleges may opt to combine elements of traditional technology-based engineering education with a strong emphasis on broader skills such as written and oral communication, management, economics and international relations. This type of program would aim to prepare individuals for technological decision-making and

policy-setting as well as for non-engineering professions. Other engineering colleges may choose to become more like "professional" schools, preparing students for professional engineering practice through the master's level. Engineering education needs own models. No one model suits every engineer or every organization that engineers serve.

Universities must put together an effective study system. A new training and certification program will base on the company's application delivery curriculum. [12]. In that way, the students will have a first hand view of how related concepts are being used in workplace. Thus, engineering education must take into account the social, economic, and political contexts of engineering practice; help students develop teamwork and communication skills; and motivate them to acquire new knowledge and capabilities on their own. Because many modern engineering projects require a combination of several disciplines, students also need exposure to the integrative field of systems engineering. The aims of engineering education will prepare an engineer to be successful in the changing workplace. It aims to equip students with technical knowledge and capabilities, flexibility and an understanding of the societal context of engineering.

Included among the often-mentioned barriers to successful use of online professional development are:

- creating quality courses that meet instructional needs;
- training instructors to successfully provide effective courses;
- ensuring there is proper support to meet student academic and online learning needs;
- and attending to the technical requirements needed to successfully develop, provide and access online courses.

That online teaching will take as much or more time than teaching traditional face-to-face classes (courses). This is because the level of interactivity with each individual student is increased [12].

3. Creating the condition for successful education for an adult learner

In October 27, 2006 in statistical indicator Eurostat shows the relation between female [2] and male [13] live-long learning students in the EU (Figure 2):

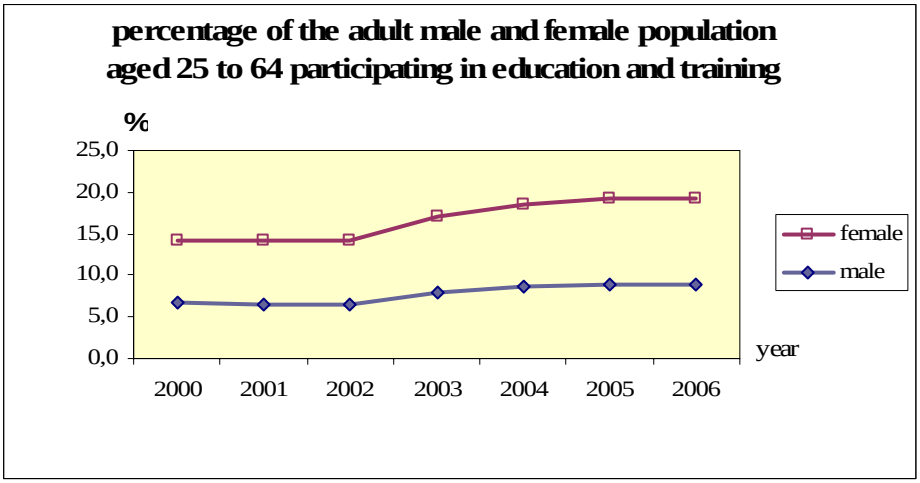

Figure 2 - Live-long learning students in EU

The percentage of adult students, who want to study, is increasing.

One education model, suitable for adult learners in EU, Learning Through Work, is found on University of Derby web site [14]. Learning Through Work is a way of getting a university qualification without having to leave the workplace. It's a form of work based learning. It's based on the simple premise that people don't always need to attend college or university to learn, because learning is part and parcel of everyday working life, and promotes continuing professional development.

In Learning Through Work, they offer opportunities for people to engage in individual and group programmes of study leading to credit and awards ranging from Certificates of Achievements to full Master's awards. They offer support through a learning contract and a simple but sophisticated online managed learning environment. Learning Through Work comparing distance learning, with recorded lectures for self-study and e-learning tutorial hours, such programs are more suitable to women; for them it is very difficult to leave their families and go elsewhere to further their education.

Responsibility for life-long learning and good technical knowledge is not just that of an individual. It is also the responsibility of the EU Commission, government, universities and employers.

In further, we can see some solutions which are connecting learning, work and family, especially in fields of technical education. This way is much more suitable for women with children and families in the EU.

The EU Commission could prepare financial support for adult learners if they want to study in other countries. They should consider PPS for regions, because it is not the same if you come from Romania or Belgium and go to England or Portugal.

Government should reduce taxes for employers who have study workers and have tax exemptions for workers who are studying.

University can prepare quality and actuality short courses to wide specters and flexible learning opportunities, like distance learning and e-learning. Each of the courses should be part of a wider certificate, diploma, undergraduate or post graduate study. All universities in the EU should prepare recorded lectures in their own as well as English language.

Employers should support their own adult learners. For example: a shorter work week (40 and more hours reduced to 30 hours) or part time work. They should offer technical support and places for studying. Many people can study after they finish their workday. They can study at their workplace because they have peace and quiet, as well as all technological support necessary in the learning process.

Finally, this way you can find individuals, who have higher personal motivation for learning in the technical field and get opportunity for their own development.

4. Conclusions

Everyone wants a good job, a lot of free time and money. But for most of us this is impossible. Modern life is like patchwork. Five days a week are for work, family, free time and personal activities. We must balance between many tasks. Study and education in technical fields (especially engineering) are not easy. One must work very hard in the new transition EU countries, because we have to accommodate to a new situation and a new position in the world. Employers want individuals who work hard, are responsible and are constantly learning new skills and widening their knowledge. How can this be done?

Life-long learning is an opportunity for workers who were not able to finish a university degree program. They want to continue their education so they can better themselves and get better jobs, as well as for personal growth. Such students are the best, because they have the personal motivation and energy to get ahead. Nevertheless, adults with good education and the opportunity to get ahead are more inquisitive and innovative.

Learning through work, like open learning and long distance education featuring pre-recorded lectures, e-learning (tutorial hours and practical modules that can be performed over a block week, with flexible schedules, or an individual program) are much better for the adult student then standard and fixed programs that the government proofed ten years ago.

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