



3 IN 1 - RECENT CHALLENGES FACED BY HIGHER EDUCATION AND THE SOLUTION: E-LEARNING

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Abstract. Higher Education in Europe faces several demanding, and sometimes contradictory challenges. Massification contra individualisation, meeting the specific needs of globalized economy and responsiveness for local needs, as well as demand for continuous quality improvement while suffering from the limitations in financial and human resources – all these problems may be treated by one single solution: e-learning. Innovative and pedagogically established application of ICT may improve versatile functions of university operation, starting with e-administration and e-delivery, and gradually approaching the full complexity of e-learning, including virtual mobility and virtual internship programmes. University of Miskolc has been involved in several EU supported projects, focusing of different scenarios and functions of e-learning, building of long-term, strategic partnership with several HEIs of the EU. Lessons learnt in these projects will be introduced, illustrating the appropriateness and success of e-learning for meeting the challenges faced by the Higher Education Institutes.

Keywords: Collaboration, Virtual Mobility, Blended learning, Open Educational Resources (OER)

1. INTRODUCTION

In the recent decades, Higher Education of Europe faces several challenges – even if we mention just a couple of key-words: Bologna, Lisbon, Lifelong learning, ICT – and we all know how dramatic changes and processes they have induced. Bologna-process aims at answering the challenges of globalisation, establishing the European Higher Education Space, demanding goals of Lisbon increases the responsibility of HE in improving competitiveness, LLL forces HEIs to change their mission and widen their strategy – and integration of ICT changes how we teach and how we learn, opening up unique possibilities for networked learning communities in a globalised education market.

HEIs in Central Eastern European region have to recognise to be even in a more complex and dramatic situation. Since the early nineties the education systems of the Central European region have faced - and are still facing - important, if not insurmountable challenges. The radical changes of the political and economical structures raised new educational and training needs from qualitative as well as quantitative point of view. The massification of the education system, especially the tertiary education system proved to be a basic tendency of the democratic systems in the developed countries and it became one of the major objectives of the Central European countries. On the other side privatised market economy generated new demands for curriculum, for new forms and methods of education. As one of the most powerful initiative, the grandiose programme of “PHARE Multi-country Programme for Distance Education” started in 1993-94 by launching a pilot project and later on, not without administrative obstacles, a massive follow-up project was accepted by the European

Commission. Elaboration of a harmonised ODL development strategy for the 11 “PHARE” countries, establishment of National Contact Points, 40 of well-equipped ODL Study Centres, training of hundreds of teachers and professors in different fields of ODL (managers, content developers, tutors), course development projects, several professional meetings, development of strategic studies – all these were very important outcomes of the PHARE MCC programme. Not only the huge number of indicators were amazing – results of the programme were not only promising, but in a unique way, intensive cooperative actions led to the building of a professional community of innovative ODL and e-learning experts.

Exactly the time period of this PHARE programme has brought dramatic development into the ODL activities of all HEIs in the world – multimedia tools and networking, on-line solutions, e-learning frameworks have been elaborated in these years. Enthusiasm of CEE ODL experts was supported by encouraging messages of our EU partners, saying: in the field of e-learning, we can stand at the start-line, together with western colleagues, without the usual stereotypes: the need for “closing up”.

But as usual, as soon as the programmes were completed and financial support was closed, results of these programmes eroded quickly and stability and sustainability of the newly formed ODL units became uncertain, and highly dependent upon the intention and involvement of host institutions’ management. However these common roots of the HEIs of our region proved to be strong enough for finding the only operable solution: keeping the network alive, new and new EU programmes have to be addressed, planning proposals to be built on each other, providing frameworks and support for continuing methodological and content development and international networking.

2. HIGHER EDUCATION IN TRANSITION

Hungarian HEIs in transition

In the past the Hungarian higher education achieved a very high standard of excellence and as a result enjoyed an excellent reputation throughout the region and the entire world. The system at one point produced the highest per capita rate of Nobel prize winners in the world. However, the Hungarian higher education system was not well prepared to meet the challenges that were emerging at the end of the 20th century. First, the system was rigid and unresponsive to the demands of a market economy. Secondly, the system was inefficient and wasted enormous resources. Third, the system was inequitable with the public sector, financing virtually all the costs of the system and private beneficiaries paying few of its costs.

In contrast to broad participation in primary and secondary education, Hungary's higher education system has been small and elitist. In 1991, higher education enrolled just 12 percent of the population group age of 18-22. Half of the students were enrolled in 5-6 year degree programs (university level training). Students were admitted by faculties into over 400 courses. The sequence of course-units was rigidly specified and few electives were permitted until recently. Students could not move from one course to another course or from one level to another without starting their studies in most cases from the beginning.

Accession to the European Union, as well as the Bologna Declaration identified the enhancement of the attractiveness of the educational market and active participation in the creation of the European Higher Education Area as the priority objectives of higher education for the sake of the economic development of the European Community. Pursuant to the principle of the free movement of labour force, it is necessary to provide for the framework of the mobility of teachers, researchers and students thereby facilitating international cooperation and innovation in higher education. It became evident that the operational and management practice of institutions is in conflict with both the tasks deriving from the size of the institutions and the social and economic expectations, while the requirement of efficient and economical operation poses a new challenge for institutions. The greater national and international cooperation, the tasks to be performed in regional development and the connection to international higher education networks demand professional competence in academic and management tasks, the adequate definition of institutional and managerial duties, powers and responsibilities, and the transformation of the structure and management of higher education institutions.

The concept of Lifelong Learning (LLL) became a key issue of public discourse about education from the second half of the 90s onwards. In the past couple of years several attempts were made in the policy field of different sectors in order to define the role and factors supporting its extension. The Hungarian strategy for lifelong learning - in accordance with the European concept of LLL - focuses on the concept of knowledge and a broader interpretation of learning. Development of individual key competences – such as ICT

and language skills - has been put into the focus. The strategy aims at constituting a consensus-based ground for the action programmes and action plans of a variety of sectors, which serve a system-like manner of development.

ODL and e-learning in Europe

Methodological modernisation, wide scale, but critical and responsible use of ICT for educational purposes, blended and e-learning approaches are considered as major tools for supporting the educational reforms and extension of LLL concept. E-learning has become the mainstream of education in the majority of EU countries and shows dynamic development in Central-East European countries as well. Widespread application of ICT in the context of the Information Society is mentioned as a priority by national development plans of CEE countries. Several EU programs and projects supported such initiatives, but international networking in course delivery still remained at low level of operability.

ODL and e-learning at the University of Miskolc

The University of Miskolc is one of the largest, state-owned provincial universities of Hungary, situated in the North-Eastern part of Hungary, which was earlier the centre of heavy industry. Founded as a mining school – and, at the same time, the first technical HE institution in the world – in Selmecbánya in 1735, it looks back on a glorious past and boasts a dynamic present. Although forced to move its location to different towns because of the tribulations of history, first to Sopron in 1919 with the Faculties of Mining and Metallurgical Engineering, then to Miskolc in 1949 adding the Faculty of Mechanical Engineering to the former two, it has never ceased to be in the vanguard of the country's higher education.

Within the last decades, it has steadily developed into an institution of real universitas character by launching taught programmes in law (1981), economics (1987), humanities (1992), teacher training, music education and health care studies (2000) in addition to the traditional engineering programmes. Now it offers BSc, MSc and PhD degree courses at 7 Faculties, one College and one Institution, for approximately 7000 full-time and 6500 part-time students. Our accredited PhD Schools (7) offer an opportunity for the further education of experts and their gaining a higher academic degree. Besides the strong, prestigious traditions and strength in engineering, the University of Miskolc offers the widest range of disciplines taught on the same campus in Hungary. This is a unique opportunity for students to carry parallel studies at different faculties, as well as to enrol complex, inter- and multidisciplinary professional training programs, especially in postgraduate level, e.g. engineering-management, economy-law, law-engineering, etc.

Hosted by the University of Miskolc North Hungarian Regional Distance Education Centre was established with the objective of coordinating the ODL and e-learning development of the institution as well as of the North-Eastern region of Hungary. In the framework of the mentioned PHARE Multi-Country Programme for Distance Education our ODL Centre was formally established in 1998, as member of the PHARE ODL Network, including 40 study centres in 11 countries of Central-East Europe.

University of Miskolc was the first HEI of Hungary, where wide-scale implementation of blended learning approach started in 2003, at all Faculties, offering free access to an advanced, complex e-learning environment, developed by Hungarian ICT experts, named COEDU. However, standardisation and more intensive collaboration with international partners induced the need to change this LMS to the widely applied Moodle system, since 2008.

Target groups of our courses represent a wide range of learners, from on-campus students using e-learning in blended learning approach, to adult professionals, needing refreshment courses in different levels and in many different professional fields. Serving for this versatility, we aim at developing advanced e-learning system, versatile courses mainly in interdisciplinary fields, offering advanced, multilingual learning environment. Since its establishment, NHRDEC have been involved in more than 30 national and international projects for developing infrastructure, ODL networking system and course development. University of Miskolc plays an important role in East-West collaborative projects, building bridges between EADTU (European Association of Distance Teaching Universities) and the former PHARE ODL Network.



Fig. 1. The single entry portal of the e-learning systems, operated by North Hungarian Regional Distance Education Centre at the University of Miskolc <http://edu.uni-msikolc.hu>

3. MASSIFICATION vs INDIVIDUALISATION

Widening the participation of young cohorts in Higher Education is still in the focus of European Lifelong Learning policies [1], while limited capacities of campus-based educations as well as diversified needs of economy may require rethinking on our education methodology. Good practice at the Faculty of Economics can illustrate, how e-learning may provide feasible solutions for all these demands.

Business Economy is a fundamental subject in the curriculum of different faculties, different levels and specialisations, as follows:

- 1st year students of BA courses at Faculty of Economics – full time and part time,

- 2nd year students at Faculty of Earth Sciences and Engineering, BSc level, full time and part time,
- 2nd and 3rd year BSc, and 1st year MSc students from Faculty of Mechanical Engineering, following three different specialisations,
- Postgraduate learners following five different, interdisciplinary curriculum, offered as joint degree programmes of four different Faculties.

While the core content taught for hundreds of students is the same and accessible via the moodle system, specific requirements, wide range of background and supporting materials, self-assessment questions, useful links, etc. are offered for the different target groups and differences in requirements are communicated by the system as well. Managing so diversified and huge number of learners would not be possible without the course management and content delivery tools of e-learning [2].

In the framework of an EU supported project, *Cross Boarder Virtual Entrepreneurship (CBVE)*, Virtual Business Planning courses were developed: an English “master” class and its four language versions were planned to be piloted in IT, ES, HU and EE. Two of the partners (UNED, Spain and UNINETTUNO, Italy) operate as single mode distance universities, with consolidated, robust IT support in their own e-learning framework, while the two others (University of Tallinn and University of Miskolc) are traditional universities implementing e-learning in blended learning approach. However, these two universities followed different approaches in content development of CBVE: University of Tallinn adapted the English master course video-lectures, just adding subtitles to the video, while University of Miskolc has developed wide range of new, versatile content elements within its five pilot-runs. All these pilot courses followed different approaches and aimed at different methodological tests. Each course has been built on a blended delivery, involving different level of ODL and collaborative elements. Emphasis was given to individual and group works, creativity and complex development of entrepreneurial skills. Flexibility and reusability of content elements were considered as key factors in further sustainability.

Knowledge pool of these content elements has been continuously widened, moreover some attractive video-films (video case studies, video-illustrations and tests) produced in our former national projects were also reused and reedited for illustrating some basic entrepreneurial skills. Demonstrating the high level of support and commitment at the Faculty of Economics, all video-lectures were recorded by different professors, lecturers. Active involvement of our strategic, associate partner, the Chamber of Commerce and Industry of the county Borsod may be mentioned also as a specific feature of our CBVE model. As part of this collaboration, the Secretary General of the Chamber gave a presentation – also video-recorded – and adult learners from three neighbouring towns were enrolled to test the Hungarian Master Class, coordinated by the Chamber, moreover, it contributed to the dissemination activities as well (newsletter, distribution of leaflets, etc.) As regular students and adult learners may learn the same courses in the

same electronic environment, interaction between the different generations is expected to offer unique, mutual benefits for both cohorts of learners.

Last but not least, our model intended to illustrate also the paradigm shift initiated by the WEB2.0 technologies: moving the focus from the education materials and technology to the user-student, to user generated content. Not only thousands of pages and hundreds of slides were produced as student generated content elements, but also video-presentations and video illustrations near to 8 hours as total have been developed by learners in the Hungarian CBVE pilot courses. The final Project Reports of students were submitted electronically in pdf – with a supplement of an English summary - and were presented to classmates, while video-recorded for future accessibility. Peer review and evaluation were in some cases extended to an institutional and national student research competition, so external evaluators assessed the project results, as well.

In addition to the asynchronous e-learning scenario, Final Seminar organised between Miskolc and Tallin utilised videoconferencing tool for direct communication, exchange of experiences at the end of the project, also involving some students, sharing their experiences.



Fig. 2. Multilingual scenario of CBVE project – demo course is freely accessible for guests.
<http://edu.uni-miskolc.hu/projects/>

CBVE project was coordinated by the EADTU, as second of two consecutive European projects for supporting employability: Cross Border Virtual Mobility (dealing with remote internships and work placements), and Cross Border Virtual Entrepreneurship (dealing with the training of students' entrepreneurial skills so as to promote self-employment). This year, two follow-up projects gained EU support in Lifelong Learning Programme: the latest flagship of CBV-series: Cross Border Virtual Incubator (CBVI), widening its participation to 17 partners from 13 countries, and the International Internship AGORA, a dissemination-type project, to be coordinated by the University of Miskolc. This latest focuses on virtual placements, which may be beneficial in many ways; they merit increased training opportunities, exposure to not/never-thought-of occupations, integration of disadvantaged individuals, and preparation of, and blending with, physical placements.

Recently a joint paper has been compiled for reporting about multi-country experiments with technology-enabled remote access to work, as a contribution to the (work-based) learning and professional mobility of students [4]. This paper first addresses the contribution of traditional

placements, followed by the strengths and weaknesses of virtual ones. Next, real pilots with virtual (work-based) arrangements are described. Regular universities experiment with virtual placements in on-campus courses and curricula, in frame of self-organised learning, whereas open universities experiment with virtual placements in off-campus courses and curricula, in frame of social-collaborative and community-based learning. Results of the different arrangements, their pros and cons are described, drawing final conclusions from the study on the development of skills and competences in students, the implemented didactics and the applied technology.

4. MEETING THE REQUIREMENTS OF THE GLOBALISED ECONOMY AND THE LOCAL/REGIONAL NEEDS

University of Miskolc is located in the traditional centre of heavy industry – a region suffering extreme difficulties in economic restructuring. Necessity for overcoming high rate of unemployment and improving economical competitiveness require highly effective technology transfer, integration and application of recent results of R+D. Complex, interdisciplinary engineering fields, showing extremely dynamic development (e.g. Computer Aided Engineering, Surface Engineering) can be regarded as energizers in accelerating these processes in wide range of industrial and economical sectors, but also induce needs for new competencies and continuing refreshment of knowledge from professionals. Among these emerging needs improvement of language skills – mainly technical English – and intercultural competencies must be mentioned as key factors in the more and more globalised labour market.

Bilingual training programme for practicing engineers

Focusing on these complex demands, our first ODL course offered for practitioners in industry was supported by a PHARE project, titled Advanced Engineering. This course was tailored to meet the specific training needs of the region, recognising that practicing engineers need not only professional refreshment courses, but also and even more importantly improvement of specific language skills. This multi-purpose competence-course supports acquisition and practice of technical English, parallel with offering highly advanced professional content in different engineering fields. Its modular structure involves 10 modules, each of 30 hours for learning: 4 of these modules offer generic subjects in English (also including basics of IT and management), 3 modules are compulsory with basic engineering topics (materials, technologies and life-cycle management) while further three are specialised – and electives – in different topics as environmental management, logistics, non-metallic materials, CAD/CAM and electro techniques – selected topics as detected needs of the local industry.

Some of the modules start with an evaluative test and ensure a flexible system of different ways of learning for individual knowledge and special professional interest by offering compulsory and optional subjects, wide range of resources (e.g. training videos and multimedia programmes) as well as project work.

Added values of international collaboration

Common roots of four EU supported content development projects in engineering go back to nearly two decades. Just after the political changes in Hungary, new possibilities opened up for professional collaboration: Hungarian experts became free to join international societies, as members, and different EU supported programmes (TEMPUS, PHARE, LEONARDO, MINERVA, ERASMUS) as partners. Our collaboration with some recognised experts and institutions in Surface Engineering (SE) started with a TEMPUS project titled: "Establishment of new courses on Materials Engineering in Hungary" (1994-97). One of its three subprograms focused on SE, based on our collaboration with University of Birmingham, aiming at the development of handouts for 15 learning units – still in traditional, printed format. Soon after completing this three year project we started to plan new opportunities: the *Innov@te* Leonardo pilot project - International On-Line Voc@tional Training in Surface Engineering – focused on wide-scale methodological experiments in e-learning development, between 2000-2004. The Innovate consortium represented top-leader experts and societies – the IOM3 (Institute of Materials, Minerals and Mining, UK) was its contractor, professionals were represented not only by universities but also the International Federation of Heat Treatment and Surface Engineering (IFHTSE), while University of Miskolc coordinated the e-learning development. Three different e-learning scenarios were tested, multilingual methodology has been developed. Video-conferencing with the University of Malta and Birmingham proved to offer extremely effective method for enriching the professional content and improving multicultural competencies of learners.



Fig.3. Videod lectures of world-wide recognised professors may be integrated into versatile courses

Based on the results of Innovate project, 72-hours continuing education e-learning course has been accredited as an adult education course in Hungarian, moreover its learning materials are widely used - in blended learning approach – for full time learners as well.

The next stage was again a Leonardo project – partly with the same consortium members, titled *e2ngineering* (Development and testing of multilingual e-learning materials and courses in advanced engineering subjects) between 2004-2006. In this project 12 short modules have been developed in different topics of Computer Aided Engineering. Valuable, multilingual case studies were developed by Technical University of Kosice, selected modules are offered in EN, HU, SK, PL & RO languages.

Innovative aspects - multilingualism

Whenever a course is offered in more languages, it means separate language versions of the course materials from which student can select. In our system, navigation language (EN, HU, SK, PL, RO, BG, RUS and LT) of the overall system can be selected by the user, when entering the system. The other level of multilingual delivery relates to content elements, which may be displayed in the following languages: EN, HU, RO, LT, BG, PL, D, F, IT, ES, SK and RUS. Learners may switch between the language versions within the courses, paragraph-by-paragraph, while system administrator may define the order of languages: any of them can be selected as “master”, while others are hidden and will be displayed in pop-up windows, when clicking on their flag symbol.

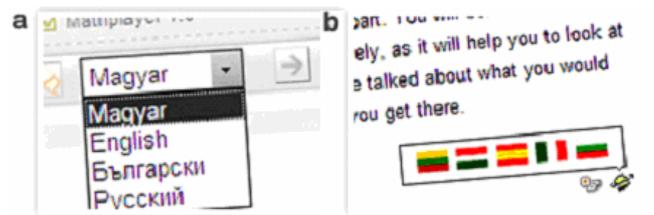


Fig.4. Innovative solutions for multilingualism: selection of navigation language (a) and multilingual presentation of core content (b)

International MSc in Heat Treatment & Surface Engineering

The most complex and ambitious program is represented by the recently completed ERASMUS project, (2006-2009) titled *MinSE* – European Master in Surface Engineering. Built on the experiences of the former projects, the MinSE project aimed at designing, developing and testing a Bologna-conform course leading to a European Master’s qualification in heat treatment and surface engineering. The part-online, part face-to-face course have been developed by a consortium of five universities and five industrial partners (scaling from SMEs to huge multinational firms), while IFHTSE provided secretariat and professional networking background. University of Miskolc was involved in both content and methodological development, playing the interface role between professionals and e-learning experts, providing e-learning development and delivery support.



Fig.5. Demo course for MinSE project can be visited by guests at <http://edu.uni-miskolc.hu/minse>

5. QUALITY AND COST EFFECTIVENESS

As illustrated by the previous projects, we followed a flexible, resource-based approach in content development methodology. Wide range of training materials have been developed as more or less independent, self-standing training units – “bite-sized” and reusable elements of knowledge transfer, offered in standardised format of the following types of learning elements:

- Core units (multilingual, text-based learning materials + questions and exercises)
- multilingual glossary, collection of links and further related resources,
- video-recorded lectures of leading professionals + lecture notes in English and native languages
- case studies as illustrations of practical applications – as platform free multimedia elements, offered not only on-line but also in CD/DVD format.

These course elements and even their building blocks, the learning objects can be used for compiling versatile course content for different target groups – as we call it, using a “lego”-system for course development. Reusability of high quality content element may decrease the costs of e-learning development, while providing effective and versatile tools for knowledge transfer.

Open Educational Resources

Further, promising solutions are offered by wide range of Open Educational Resources, published on-line, under Creative Commons licence in several disciplines. Instead of reinventing the wheel, multimedia illustrations can be cost-effectively integrated into our own curricula. University of Miskolc is involved in the consortium of a newly launched LLL project, called Open Educational Innovation and Incubation (OEII), coordinated by EADTU. The primary objective of this project is to formulate recommendations on the organisation of a more transparently organised and sustainable university-market interface, which is receptive to inside and outside developments, and the valorisation of educational innovation powered by commercial and Open Educational Resources (OER).

6. LESSONS LEARNT

Higher Education in Central and Eastern European Countries faces several challenges, difficulties, shortages and barriers. The Bologna process, the increasing demand for fast response to the needs of their restructuring economy, changing mission of HEIs transferring from elitist to mass-education, wide-scale implementation of life-long learning concept – all demanding reforms to be implemented in the same time, in a period of economic restrictions and shortage of financial background.

Flexible e-learning methodology may be considered as the most suitable tool for enhancing educational networking, offering several benefits of increased accessibility, cost effectiveness, individualisation of learning process,

widening inclusion and balancing regional, social and cultural differences. The most important, common characteristics of our projects are the followings:

- Flexibility of creating different courses meeting with different needs in relevant subjects as well as flexibility of the courses using Open and Distance Learning methodology, basically asynchronous, autonomous self-learning, but also advanced networking facilities, e.g. video-conferencing.
- Availability and delivery of the materials in multilingual versions – supporting simultaneous development in professional content as well as in professional English, promoting harmonisation in adequate usage of terminology of advanced, interdisciplinary areas.

Developing innovative methodology and ICT applications may offer us a chance to play active role in the mainstream of European HE progress.

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