

INTERNATIONAL FRAMEWORK FOR MODERNIZATION OF HIGHER EDUCATION: THE ACADEMICA APPROACH

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Abstract: *The paper presents an approach for modernization of Higher Education based on improvement of accessibility and harmonization of University curricula through scientific cooperation, knowledge transfer and exchange of best practices, established in the framework of the international project ACADEMICA, for voluntary convergence with:*

- *the European educational standards and National priorities;*
- *the achievements and expertise of EU in the development of modern learning environments;*
- *the good EU practices and innovative ICT-based methodologies for teaching and learning.*

In the paper are briefly presented the main results and outcomes achieved in the work during the lifecycle of ACADEMICA project in which 15 organizations from seven European and Central Asian countries were involved.

Key words: *e-Learning, SCORM, Higher Education, Technology enhanced learning (TEL)*

Introduction

The exponential growth in digitization and internet connectivity is the backbone of the Fourth Industrial Revolution. Automation, big data, and artificial intelligence enabled by the application of digital technologies could affect 50% of the world economy. [1, 2]. Today's digital landscape has dramatically imposed the necessity of relevant digital skills and competences as a key factor for ensuring social cohesion as well as sustainable growth. The globalization and knowledge-based economy as well as the recent evolution of information and communication technologies (ICT) change dramatically the Higher Education (HE) paradigm. Digital technologies and new requirements of learners and the labor market are the main drivers of the digital shift and better exploitation of innovation and potential that new technologies can offer. It is crucial for the HE Institutions to adopt modern approaches in delivering knowledge, ensuring quality standards as soon as possible in order to create opportunities for entry to new markets and new global partnerships, to stimulate new distribution approaches and opportunities for students of all backgrounds. [3-5].

In order to support the modernisation, accessibility and internationalisation of the HE the European Commission launched (as a part of the Erasmus+ Programme) the Capacity Building in the Field of Higher Education (CBHE) initiative. In this paper are presented the developed methodology as well as the main outcomes achieved in the framework of the international project ACADEMICA „Accessibility and Harmonization of Higher Education in Central Asia through Curriculum Modernization and Development“ [6] which was a three-year Erasmus+ CBHE project involving 4 Universities from Europe (Bulgaria, Italy, Austria and Spain), 8 Universities from Central Asia (4 – Kazakhstan, 2 – Uzbekistan and 2 – Turkmenistan), Kazakhstan Association of Engineering Education, Ministry of Education and Science – Republic of Kazakhstan, Ministry of Higher and Secondary



Specialized Education – Republic of Uzbekistan. The main aim of the project was through the development of cooperation network among the partners and initiation of intensive knowledge transfer processes and procedures to:

- contribute to the capacity building and modernization of HE in the Central Asian Universities involved in line with the requirements of the digital transformation;
- support the HE Reform at all levels;
- facilitate the active inclusion of the Universities in the global digital educational space.

Identification of the aspects and needs for modernization of HE

The research phase of the project aimed to detect the current state of the HE in Engineering and Engineering trades and, on the basis of the extensive survey to outline the aspects and measures for improvement the capacity of the Universities from Kazakhstan, Uzbekistan and Turkmenistan in line with the modern globalized networked economy. This phase covered desk research as well as research in the field.

The desk research was conducted by the local teams of all Central Universities involved. During this stage of the research phase, information regarding the academic programs (with focus on Engineering Sciences) was collected. The assessment of the of the academic programs' consistency with the requirements of the European HE was done on the basis of a set of criteria and indicators such as the share of core (required) and elective courses; share of the teaching staff with a doctoral degree/PhD; usage of European best practices, collecting information about similar European teaching programs and curricula; policy toward usage of modern approaches and methods; existing quality assurance systems; share of new courses (subjects) which have been introduced in the program's curricula for the last 3 years and, many others. The current state of the ICT facilities and ICT based education was also under the focus of this research together with the competitiveness of education and the employability of graduates. The research in the field covered three target groups – students from Universities involved; habilitated university lecturers as well as business actors – managers of companies providing professional realization for the graduates. A total of 391 participants were involved in the survey. 57% of the them are students and 26% are full-time lecturers at the Central Asian universities involved in the project. The rest 17% are business participants - top level managers of companies in Kazakhstan, Uzbekistan, and Turkmenistan.

The aims of the surveys were to be identified key problems, needs, strengths, aspects and priorities of the CA partners to benefit the harmonization in the context of the ACADEMICA project framework particularly:

- the quality of the educational system and the openness of tertiary education toward the leading international experience: the curriculum content; the adoption of modern methodologies and methods of teaching; the extent of ICT usage and the application of ICT-based approaches
- competencies and skills of both trainers and trainees: digital and communication skills, foreign language competencies, transversal skills as well as trans-border mobility of students and academics enforcing the development of these skills
- „HE-business and community” interaction, the adaptability and flexibility of the graduates to the labor market requirements and the deficit of skillful labor force with specific professional qualification.

With the data we were able to identify the needs, gaps, and aspects for curriculum modernization and harmonization through integration of contemporary ICT based solutions, pedagogical approaches, and tools for an expanded access to education and improvement of

the quality of teaching and training in line with the ECTS, Diploma Supplement, ET2020, and Modernization Agenda.

In general, Kazakh students and lecturers possess core basic digital competencies related to social, personal, methodical and business aspects. With respect to Uzbekistan, it seems that educational platforms need to be developed with appropriate level of digital content and adequate criteria for operating and maintenance of an e-learning system as well as some e-learning quality assurance. Turkmenistan faces the need of basic material in educational institutions and modern computer equipment with the additional barrier that means to confront an unreliable internet connection, which should be solved in a short time.

The main concepts of the methodology

Transforming HE requires pedagogical, organizational and technological innovation, and one of the basic conditions for enabling learning practices to flourish is the availability of relevant digital policy, technological infrastructure, and highly qualified staff. The proposed methodology is focused on the capacity building in HE taking into special account the following aspects: technology, human resources, and organizational aspects.

Development of appropriate IT infrastructure as well as online environment capable of supporting multiple courses over the full range of the academic program, giving a consistent interface within the institution and-to some degree-with other institutions using the system. Web-based applications that provide teachers, learners, and others involved in education with information, tools and resources to support and enhance educational delivery and management, have been integrated in VLE.

The methodology ACADEMICA Training Path was developed taking into account the specific outcomes from the needs and gaps analysis provided at both national and international level, as well as the recommendations from the research phase, which considered national and regional priorities and policies, and the European achievements in the HE domain. It is a flexible, cross-disciplinary ICT-based methodology with a purpose to improve the accessibility and quality of HE (especially in Engineering specialties) in Kazakhstan, Turkmenistan and Uzbekistan.

The two main pillars of the methodology implementation were:

- train-the-trainers course addressed to the University lecturers tailored to the identified needs for improvement and enhancement of their key and transversal skills and competences related to the provision of technology enhanced learning (TEL) in line with the standards and guidelines for quality assurance in European Higher Education Area. The competences of university lecturers are of exceptional importance, mainly because lecturers constitute the basis for the creation of new knowledge and new values beneficial to the university as well as to students, and subsequently also to enterprises in the role of employers, who should be able to use reasonably and develop systematically the mature competences of their employees;

- virtual learning environment (VLE) – open and flexible, with learning area embedding a diversity of learning and teaching practices and responding to the personalized needs of each learner and with social area where all participants could communicate, collaborate and share knowledge and experience.

The design and development of VLE and the e-course for trainers were done in parallel by different working groups where experts from all organizations participating in the project were involved.

The e-course aimed at providing CA lecturers with a tool able to start a modernization of their curricula by using modern technologies. It has been designed and developed in order to respond to the requirements of teaching methods modernization, also revealed



through the needs analysis conducted in the first phase of the project. This analysis showed that only a small fraction of both CA students and teachers, involved, tried a modern ICT-based approach despite a large part of them is aware of its potential. The whole learning content was organized into six modules:

1. „E-Learning Evolution” – it describes how the e-learning approach has been changing and evolving over the years;

2. „Distance Learning Fruition” – it examines the tools characterizing distance learning lessons.

3. „E-Learning Pedagogical Aspects” – particular emphasis is given to the comparison between traditional and distance learning in order to show strong and weak aspects of the two approaches;

4. „Style and Formats” – it includes all aspects related to styles and formats to be used when approaching distance learning; more specifically, it explains how the structure of every learning object has to be prepared to achieve the best results;

5. „Social Enhanced Learning” – includes an analysis of social networks like Facebook and Twitter and professional platforms like ResearchGate and LinkedIn in order to outline the opportunities they offer to increase the student-teacher and the student-student interaction.

6. „Multimedia Products” – it analyses multimedia products intended as the most advanced technological solutions that can be specifically developed for distance learning.

VLE was developed. In it web-based applications, that provide teachers, learners, and others involved in education with information, tools and resources to support and enhance educational delivery and management of the educational process were integrated. The virtual learning environment comprises the following components:

- Central part where the training of the university lecturers in new ICT-based approaches and methods for teaching and learning was implemented and communication area for co-operation and collaboration at international level was assured. Thus, the proposed methodology was piloted (experimented) by lecturers selected at university level - first experimentation stage.

- Local (institutional) e-learning environments and computer laboratories established (with project funds) in the involved CA universities where the trained lecturers equipped with digital skills and competences to modernize their disciplines and to approbate their courses with control groups of their students – second stage of the experimentation. The overall concept of the VLE is presented on the Figure1.

The course content was organized in modules. The structure includes an introductory module, six learning content modules and six library modules (one per each content module) as well as an overall course Library. Each module consists of several topics related to the main theme of the module. Each topic's content could be represented via learning objects which could be one of the following formats: Multimedia lesson; Slides; Lecture Notes; Tests. The start and end of every content module were fixed but inside the module the trainee was free to pass the integrated multimedia lessons and other course components in their own pace and in preferred order, thus constructing their own flexible training paths.

The multimedia lessons were developed in line with the standard SCORM (Sharable Content Object Reference Model) developed by the ADL (Advanced Distributed Learning) project [7]. The main aim of the standard is to allow the implementation of reusable content material as learning objects, within a technical framework conceived for computer aided learning and through the Web. As SCORM is widely adopted by Learning Management Systems (LMSs), Learning Content Management Systems (LCMSs), authoring environments, assessment engines and course management systems, it is characterized as the most

important development currently occurring in the area of eLearning standards and specifications. The use of SCORM enables reusability, accessibility and durability of the learning material in technology changes, and interoperability between different e-learning platforms.

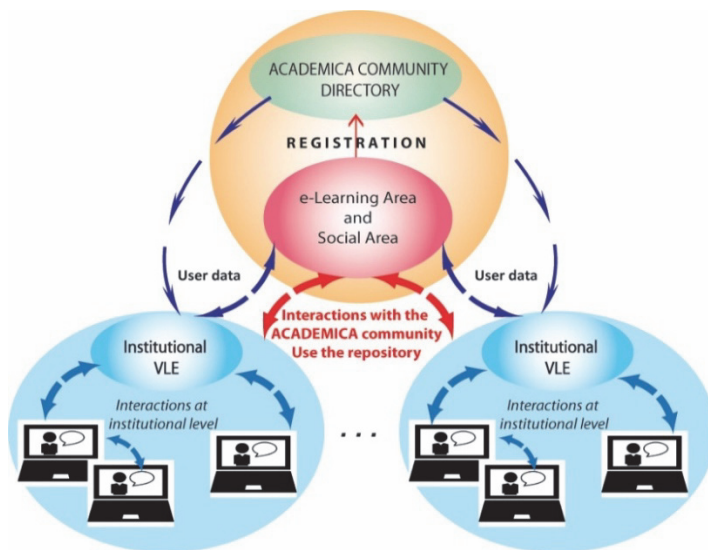


Figure 1. Virtual learning environment – central and local part

Each module ended with a virtual class. This activity redirected trainees to Google Hangouts [8] - a messaging service for mobile and the traditional desktop web. It allows video calls with groups of people, and moreover – broadcasting the calls live with Hangouts on Air. The links to the webinars were provided to all participants via the description of the activity published in the e-platform together with other important details such as: date and start time; duration; agenda, and additional materials (if any). The aims of these activities were:

- to provide trainees with a summary of the module (progress, results achieved, and other key elements of the learning) prepared by the instructor/s;
- in interactive mode to provide trainees with comments and feedback on previous and current experience;
- holding an open discussion about the test results as well as about the additional module related topics, sharing experience, real life examples, information and know-hows among the participants.

Virtual classes provided the opportunity for all participants to get together in order to see each other and to communicate discussing hot topics and questions related to the module, to the training, to the modernization of their own disciplines and so on. This had a high contribution to strengthening the team spirit, the improvement of the collaboration level, and facilitated the cooperation among the involved participants at all levels - institutional, national, and transnational. The virtual classes were recorded and published in the YouTube channel so participants who had not been able to take part in the activity could have access to the activity record.

Apart from the virtual classes the collaboration, successful communication among the participants, and community building process were facilitated via of the provision of forums. Of course, the forums for teaching (sharing content) and forums for student

interaction (creating content) require different strategies. Forums are well suited for trainees to communicate with each other as well as to co-create content. The trainees were able to participate in threaded discussions, share files, collaborate and explore topics, and write together. All participants in the training were able to exchange messages with other participants using the built in the VLE messaging system. Apart from the tools described above participants are able to use all communication channels available such as Skype, e-mail, Viber, and many others.

Social network tools were also considered in the conceptual model in order to make use of their opportunities for the training as well as for professional development. The project activities were announced and presented via Twitter feeds, LinkedIn articles and in the ACADEMICA Facebook group.

Experimentation - Stages

The proposed methodology was experimented (piloted) with the involvement of the representatives of the two main target groups – CA University lecturers and students. The overall experimentation process was conducted in two stages. During the first stage only the lecturers were involved, whereas during the second stage of experimentation both the lecturers and control groups of their students were involved.

During the first stage groups of lecturers from all CA Universities involved were trained via the e-course. The training was with duration of 12 weeks. To finish successfully the course trainees had to pass all the modules and to prepare a course project – syllabus of their own course, modernized through integration of ICT-based contents, tools, and approaches proposed during the training. The selection of the right set of tools and methods is responsibility of the lecturers who are experts in their subject domains and know well the educational context and profile of their students.

The syllabi developed as a course projects were revised and approved at university level and on their basis the second stage of piloting was implemented.

During the second experimentation phase the lecturers who successfully passed the training, piloted their own modernized courses through approbation with control groups of students. During the second experimentation phase the piloting of modernized courses was continuously monitored by the local teams and supported by the European partners.

The next figure presents the experimentation stages outlining the involved target groups and the main activities carried out.

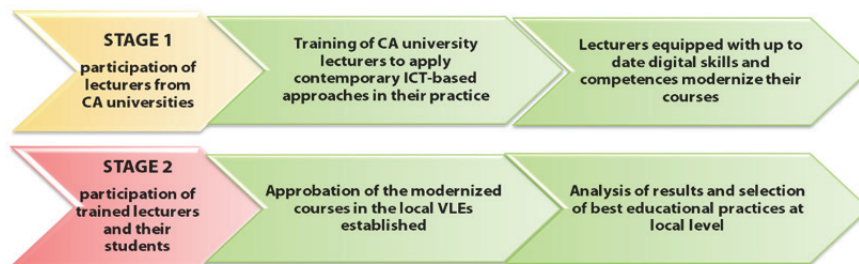


Figure 2. Experimentation stages

Before and after each experimentation stage, surveys among the involved participants were conducted, in order to collect the information and feedback regarding the expectations and satisfaction of the participants in the first and second stages of piloting. Afterwards the

collected data were analyzed and the evaluation results were elaborated together with the outlining of best practice examples.

Experimentation - Results

Trying to depict a profile of the participants involved in the first experimentation stage, 3 indicators have been taken into consideration: sex, age and teaching experience. When considering the overall sample, on a total of 126 participants (82 – Kazakhstan, 20 – Turkmenistan, 24 – Uzbekistan), the sex divide is quite balanced, with 55% females and 45% males. However, the comparison between countries can provide new important information: while in Turkmenistan the sample is well balanced, in Kazakhstan and Uzbekistan we have, respectively, a higher females and males population. The age of the participants shows a large percentage in the range 20-40, more than 70%, while the other 30% is for the over 40. This larger fraction of younger instructors has been confirmed also at national level in all three countries. Concerning the last indicator – the teaching experience, the reports showed that the most experienced instructors have been selected to modernize their courses. This is a very important aspect to be considered since this means that, despite the large experience, these instructors are ready to learn new stuff and modernize their courses using modern technologies.

The train-the-trainers course was successfully finished by 97% of the trainees. These data show the good level of web infrastructure reached by all these countries in the CA region hence it is an independent proof of the possibility to use web-technology to modernize curricula. The average result obtained in each module was always above 9.4 on a maximum of 10. This means that the didactical material provided in the course is clear and well understandable by participants.

After the end of the first experimentation stage, a survey aiming to collect data about lecturers' satisfaction from the course and provided tools and facilities was conducted. 110 respondents provided their complete answers. The analysis of the collected feedback regarding the first stage of piloting shows that more than 90% of the involved lecturers perceive that they now know more about the activities related to ICT-usage in classrooms than before the training. Consequently, the models, approaches, and tools selected for the methodology implementation are appropriate and efficient. The summarized result from the survey analysis is presented on the next figure.

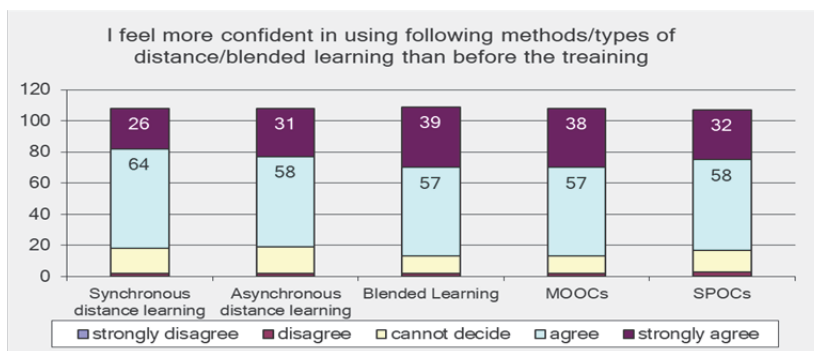


Figure 3. Results from the 1 stage of experimentation

85% of the developed syllabi of modernized courses were approved at University level and approbated with control groups of students during the second experimentation stage. Finally, when considering the division between Bachelor and Master subjects, a dominant

number of Bachelor curricula can be observed. In this case the difference between countries is quite evident: In Turkmenistan, 100% of the selected subjects are for master courses while in the other two countries the larger percentage is for bachelor courses.

1330 students (990 from Kazakhstan, 120 from Turkmenistan, and 220 from Uzbekistan) took part in the modernized courses' approbation. The analysis of the collected feedback regarding the second piloting stage shows that more than 90% of the involved students in all three countries are satisfied which means that the expectations of the courses met the outcome. (Figure 4)

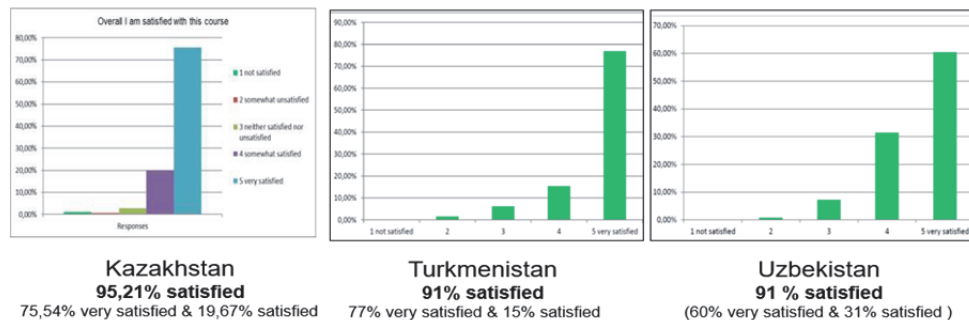


Figure 4. Students' satisfaction after the piloting stage

Conclusions

The evaluation results showed that the courses were satisfying for a vast majority and helpful for almost every participant. The expectation surveys showed that there was a knowledge and competence gap in digital competences of respondents that was closed at least a bit via the application of the methodology. Beside that the expectation has met the outcomes, the satisfaction survey results showed that the participants really learnt a lot and want to continue learning in a virtual environment, as they perceived that they increased the knowledge and competences. Now, a vast majority feel more confident and familiar when using the TEL methods. These positive results prove the efficiency of the proposed methodology and its contribution for strengthening the collaboration and knowledge transfer in HE.

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