U-Learning - Training of Qualified Specialists in the Field of Life Sciences

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***Abstract**: In the report are presented the generations of e-Learning and their applicability. Examined are the main problems of the educational market in Bulgaria, approaches and solutions in the University of Forestry, in order to implement smart education and intelligent learning environments.*

***Key words:** E-Learning, M-Learning, U-Learning, Life sciences, Smart education, Smart learning environments.*

INTRODUCTION

Education is important for social and economic development, and today's higher education is a key area for maintaining the competitiveness of each country in the globalized knowledge-based economy. As stated in the communique adopted by the participants in the World Conference on Higher Education in July 2009: "In no time in history has been more important to invest in higher education as a major force in building an inclusive and diverse knowledge society "(UNESCO, 2009).

In the strategy adopted by Bulgarian government for effective implementation of ICT in Education and Science (2014-2020) main objective is to provide equal and flexible access to education and scientific information at any time and from anywhere - from desktop computer, laptop, tablet, mobile phone.

This strategy for the first time creates conditions for building a unified information and technological environment, serving schools, higher education and science. National electronic platform will provide training with electronic textbooks and other resources. New technologies in teaching will make lessons more interesting and attractive, will motivate students and trainers.

The strategy includes three stages. In the short term (2014-2015 years) were made key investments. Under construction is a unified high-speed optical network connecting the regional inspectorates of education, universities and research centres, which will allow the use of a completely new kind of integrated services related to communication, sharing of documents in real time and paperless document flow access to impressive amount of databases, multimedia files and more.

It is planned for at least 50 percent of all schools and research institutes to be provided wireless network. Introduction at this stage of a national electronic platform for learning management and content will enable e-learning and integration of today's electronic learning materials and future electronic textbooks.

The mid-term stage - "Mobility and Security" covers the 2016-2017 period. It will include providing a lasting optic high-speed connectivity to educational institutions, enabling work with multimedia materials in real-time, implementation of joint open online tutorials and more; opening of educational and scientific environment to mobile devices and the beginning of successful practices in mobile learning (m-learning); introduction of a digital platform for video tutorials, teleconferences and development that will allow remote connections with the scientific and educational institutions in other countries and will encourage collaboration on scientific projects; provision of electronic materials with interactive content in all general education subjects.

The long term phase (2018-2020) is defined as "Universality and sustainability." The vision is to create a unified educational environment for extensive training (u-learning), transition to electronic textbooks in all subjects, virtual classrooms and laboratories, a national system for online exams and external evaluation.

1. THE BASIS

Competitiveness, innovation and workplaces created by European industry are increasingly dependent upon the use of new technologies in the field of ICT.

This should be supported by a workforce with the necessary knowledge and skills to use these new technologies effectively. As an example - Hybrid business-technology workplaces: professions, that require combination of programming skills and skills to design, and analyze data - what data are needed, from where to be obtained, require an understanding of business processes and operations, as well as marketing. In the 12-month period (April 2014-March 2015) in the US there are more than quarter million ads for recruitment of such specialists[18].

As the new technologies are developing rapidly, the required skills for their use are becoming increasingly complex and should be constantly updated. People with a creative, innovative thinking and higher-level conceptual skills are becoming more sought after.

The shortage and mismatched digital skills lead to the digital gap and negatively affect the growth, competitiveness, innovation, employment and social cohesion in Europe. The importance of e-skills in Europe is universally recognized. Proof of this is the Grand Coalition for Digital Jobs: the European Commission initiative for partnership of numerous stakeholders, having as objective to deal with the lack of digital skills in Europe and thousands of unfilled job vacancies in ICT in all sectors of the industry.

Source: https://ec.europa.eu/digital-single-market/sites/digitalagenda/files/Grand%20colation%20map.png

[18] https://facetgroup.wordpress.com

Led by globalization, rapid technological developments and the requirements to teach and train knowledgeable, skilled and competitive specialists, universities are facing huge challenge to improve the quality of higher education and expanding access to it while reducing resources. They are forced to be innovative and to train, using the most advanced technologies, in order to meet these expectations.

2. GENERATIONS OF E-LEARNING AND THEIR APPLICABILITY

The development of e-Learning is associated with the evolution of the methods using Web for support of the training. From this point of view in the literature are considered basically two generations of e-Learning - 1.0 and its superstructure 1.3 and e-Learning - 2.0.

First generation E-Learning 1.0 and E-Learning 1.3

E-Learning 1.0

In E-Learning 1.0 construction of content is similar to the traditional training models. The training is realized through synchronous courses within virtual training course or asynchronous courses. For managing the processes is used LMS.

Applicability: 1.0 is suitable where the volume of content is large, the number of students is sufficient and guaranteed and their needs are known. This is suitable for certification training.

E-Learning 1.3

The construction of content is usually based on the use of templates, allows rapid development (rapid e-learning). The learning process is divided into smaller parts (modules). It allows the use of virtual classes and discussions, as part of the overall learning process.

Applicability: suitable for quick targeted training or transmission of information about new products, procedures, systems, etc.

Second generation - E-Learning 2.0

The construction of content is usually based on tools that combine easy content development, content distribution via Web 2.0, embedded tools for collaborative learning and work. The training is done by granting access to content that is created by both experts and the learners themselves, and also communication with colleagues via social networks. It allows the synchronization of professional development and training in a process, eventually managed by the learners themselves.

Applicability: suitable for training, which content can be effectively formalized without serious investment for analysis and development, because of the flexibility of updating and reproduction in the processing of large quantity of information.

Third generation - M-Learning

M-Learning, defined as e-learning, based on mobile communication tools [8, 10]. Benefits of M-Learning education: accessibility, mobility, interactivity and absence of dependence on place and time.

Applicability: suitable for context-based learning, but as mobile learning can be applied anywhere, it is also suitable for all other types of training. Its advantage is in training which is dependent on the situation in which the learner and tutor are located. Another advantage is that through localization of the mobile device it can be provided with selected educational content, on a language suitable with the location of the learner, which is determined automatically. For example, if the student is in Bulgaria, he/she receives materials that are only in Bulgarian.

Fourth generation - u-Learning (ubiquities learning)

Universal, comprehensive training developed on the basis of various modern technologies. Such training allows students to use mobile networks and WiBro technologies to record and study educational content of high quality [4]. u-Learning enables the implementation of joint educational and social activities with people from around the world.

This trend in e-learning is developed in the Republic of Korea, which is one of the world leaders in the use of information technology in education. This is confirmed by the decision of UNESCO to award the prize for use of information and communication technologies in education in 2006 to Korea.

Why u-Learning

When you need to build flexible educational content tailored to the dynamics of the labour market, you can't talk about other than smart education and intelligent learning environment. Smart education is a new paradigm in global education practice. The objective of smart education is to improve the quality of lifelong learning. It focuses on contextual, personalized and seamless training to promote intelligence of learners and facilitate their ability to solve problems in complex environments. With the development of technology and within today's society, smart education will face many challenges, such as pedagogical theory, educational technology, teacher training, educational structures and educational ideology as a whole [11].

According to research of Monster Inc[19] in 2014, 40% of jobs in 2020 are still unknown in 2015.

The question arises how to prepare educational materials and qualified specialists for professions that are still unknown? The answer could be u-Learning (ubiquities learning). Some prerequisites for this are:

- The development of mobile technologies - Mobile devices available for the massive use. There are 17bn connected devices today (population of the Earth - 7.3 billion.) In 2020 there will be 75 billion connected devices.
- 4G mobile networks are widely available, by 2020 is expected a mass access to 5G networks
- Internet of Things (IoT) is a system of interconnected computing devices, mechanical and digital machines, objects, animals or people, which are equipped with unique identifiers and the ability to transfer data over a network without requiring human - human or human – computer interaction. We have enough data to fill a stack of DVD-s, reaching from the earth to the moon and back. Experts believe that IoT will consist of almost 50 billion objects until 2020

u-Learning is a new paradigm for learning. This is a logical development of conventional training in E-Learning, expanded by the development of mobile technologies till M-learning and the u-Learning today.

u-Learning is a paradigm of learning that takes place in a ubiquitous computing environment that allows learning the right thing at the right place and time in the right way. This environment supported by technologies, enable students to have access to digital resources and interact with the systems of learning in any place and at any time, but also actively provide them with the necessary guidelines for training, support tools or offers the right place at the right time and in the right form [5, 6, 7].

Characteristics of u-Learning:

- Persistence: the content remains, unless the student does not eliminate it intentionally;

19 http://www.monster.com/about/a/Jobs-of-Future (07.06.2014)

- Accessibility: the content is always available for use when the learner needs it;
- Directness: the content can be extracted from the learner at the moment;
- Interactivity: learners can interact with trainers and experts efficiently and effectively through various media;
- Context-oriented: learning environment can be adapted to real situations of the students and provide them with adequate training information.

According to Zhi-Ting Zhu, Ming-Hua Yu, Peter Riezebos [11] the expectation for smart education is to reduce the cognitive load of learners and thereby enable learners to focus on process of absorption and assimilation of content .

Main problems of the educational market in Bulgaria

There is a clear disproportion between secondary education and higher education - while the number of secondary school graduates follows a steady trend of decline, due to demographic collapse in the country, in recent years the planned admission of students in higher education institutions is constantly growing. The lack of balance between the number of graduates and number of accepted students in universities is obvious.

At university graduates level, the trend for several years, and the latest data of the NSI is an oversupply of bachelors and masters in economics and administration, and specialists in social sciences and human behaviour. The analysis of the labor market in Bulgaria shows a deficit of specialists in the field of natural sciences, engineering and medicine.

In terms of quality of educational services there is a trend of significant discrepancy between the knowledge and skills of graduates and the requirements of the labor market.

Widely discussed in recent years are the discrepancy between the knowledge and skills, declared in the diploma, and those actually presented in practice; backlog of teaching methods of new technologies and students' attitude towards their common usage; demotivation of young teachers and researchers, aging academic staff at universities, etc.

In the report of the conference organized by the European Commission and broadly represented in the global educational community in 2012, "Challenges and trends in the continuous development of skills and careers of European workforce" (European Business Forum on Vocational Training, EK, Brussel 7-8.06 .2012) was commented the so called Model "70-20-10." The model expresses the understanding of the current managers of the surveyed European organizations for competencies, which are received respectively 70% on the job, 20% through mentoring and coaching and only 10% through direct training [1].

The model for the modern design of educational service in the higher education is based on team teaching, involving the teacher, business representatives and students. Each of the three groups play the typical role: the teacher is teaching the director of the team who knows the subject in its entirety; business experience brings innovation practices and provides concrete examples and real cases; the student can participate in the value creation of training intended for him. [3]

The characteristics of the modern model of innovative training are: active participation of the student in the learning process, the ability to use the acquired knowledge in real terms; presenting the information in various forms and individual approach to learning [9].

The business is increasingly focused on the recruitment of specialists with potential and additional qualifications. This statistic confirms the need for major reforms in the Bulgarian educational policy. A very important step to solve the problem of youth unemployment is a continuous dialogue between educational institutions and businesses with a view to modernizing educational content and teaching methods to balance labor market demand and supply of suitably qualified professionals. Currently the focus of many

European projects and programs placed this problem and educational institutions seek adequate solutions.

Approaches and solutions in the University of Forestry - Sofia

The University of Forestry in Sofia is the only one of its kind in Bulgaria. It trains students in many life science and technology areas: forestry and forest use, wood technology, engineering design, ecology and environmental protection, industrial management, and landscape architecture. It also trains students in Veterinary medicine, Agronomy, Plant protection, Business management and Alternative tourism.

The University is a leading educational and research center in the field of management and sustainable use of natural resources.

In the period 2013-2015 University of Forestry successfully developed and implemented project BG051PO001-4.3.04-0052 "Development of center for electronic forms of distance learning at the University of Forestry", with the financial support of Operational Program "Development of Human Resources" which main objective was the construction of infrastructure, implementation of an electronic platform for supporting training and development of educational content for all specialties and degrees in the University. The project allowed the University of Forestry to implement for training purposes the platform "Blackboard" - that is used in 70% of the leading Top 200 universities in the world. Each student receives individual user account for the platform at the start of his studies in the university. Students have the opportunity to access the educational content built from a variety of clients, including computer systems, tablets and phones, to carry out individual preparation related to their extracurricular employment, to perform activities assisting the auditory work, to take exams online in computer labs of the University Computer Center and other [12, 13].

Through the implementation of projects under Scheme BG051PO001-3.1.07 "Updating the curriculum in higher education in accordance with the requirements of the labor market" in the UF were implemented projects whose main objective was to improve the quality and content of curricula for specialties in Faculty of Ecology and Landscape architecture and the Faculty of business management and teaching methods, according to the European Qualifications framework (EQF) and National Qualifications framework (NQF) to achieve a modern and business oriented training to acquire the knowledge, skills and competencies and develop mechanism for their continuous updating through lasting connections between UF, related businesses and research institutes [1].

Within the project BG051PO001-3.1.08-0033: "Improvement of management at the University of Forestry" Operational Programme "Human Resources Development 2007-2013" are developed tools and procedures in construction in university system for monitoring of indicators of group 5. Prestige and group 6. Implementation and connection to the labor market of the ranking system of universities developed and maintained by the Ministry of Education, through interviews with stakeholders in the system "Alumni Network". In 2014 and 2015 were conducted survey Feasibility studies students degrees "Bachelor", first and the last course; Degree "Master" first and the last course, employers and alumni students. The results were processed with SPSS, are made SWOT analyzes on relevant groups. On the basis of conducted surveys and analysis of the results are proposed measures and initiatives for action providing resistance or improving the performance of the UF in these groups of indicators. Some of these measures and initiatives [2]:

MEASURE	INITIATIVES
Enhance training in information technology, foreign language training, economic subjects and entrepreneurship.	• Updating the curriculum in information technology, foreign language training and economic disciplines; • practical training for the application of relevant knowledge in the specific application area of each specialty.
Increasing the quality of the theoretical knowledge	• Active inclusion of business in education; • Updating the curricula with the participation of representatives of business; • Introduction of new teaching methods; • Regular feedback from students for evaluation. • Increasing the qualification of the academic staff.
Increasing the quality of the practical knowledge and skills	• Strengthening the partnership with the business; • Development of joint internship programs and providing such for students from University of Forestry from any professional field or specialty. This will allow employers to learn about the quality of students and will eventually contribute to their more successful career in the labor market. Positive example in this respect is the agreement between the faculty "Forestry" and Executive Forest Agency. • Regular feedback from students for their evaluation. • Assigning the in-house seminars and lecture modules to proven practitioners.
Regular reporting of indicators in the rating system	• Developing a procedure for conducting regular surveys of students, employers and alumni of the UF registered in the system "Alumni Network".
Providing mobility for students and teachers.	• Using the capabilities of the projects, financed by EU structural funds; • Building and maintaining partnerships with universities from the EU, Russia and the neighboring countries;
Modernization of the education and accreditation of distance learning.	• Introduction of electronic forms of distance learning.
Establishing UF as a center for lifelong learning.	Further development of the Center in the UF for research and knowledge transfer, in order to disseminate knowledge, in a wide range of topics, in the field of forestry, woodworking and furniture industry, engineering design, ecology and environmental protection, landscape architecture, agriculture and veterinary medicine and management activities in these areas; Offering specialized courses at the Center for Continuing Education.

CONCLUSIONS AND FUTURE WORK

In smart education and intelligent learning environments, students can study flexibly and work together and thus will encourage the development of personal and collective intelligence. Moreover, it can provide better personalized assistance in training and achieve better results. All this will lead to flexible and efficient training in dynamically changing environment and requirements of the labor market.

To summarize paradigms for training:

- E-Learning - Learning in the right time.
- M-Learning - Learning in the right place and time.
- U-Learning - Learning the correct thing at the right place and time in the right way.

We think in this summary is hiding the answer to the question why U-Learning is the choice for training qualified specialists for profession that is still unknown and this is the future development of the educational environment.

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