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ON-LINE PROFESSIONAL TRAINING FOR WORKERS WITH THE MOODLE SYSTEM TO IMPROVE PROFESSIONAL SKILLS IN GREEN CONSTRUCTIONS

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Abstract. *On the global agenda, environmental issues are becoming ever more pressing every moment. At present, it is not enough for individual countries to tackle global climate issues on their own. The time has come for a joint effort to mitigate climate change. The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change, dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, starting in the year 2020. The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 C above pre-industrial levels, and to limit the increase to 1.5 C, since this would substantially reduce the risks and effects of climate change. It is not enough for states to sign this type of act, they need to take active steps to implement them and achieve the set goals. Energy, green construction, resource saving, educating the population, new and advanced teaching methods - all that is required for any global setup to be locally addressed. Now, we are in a situation where the exchange of transnational experience and knowledge is an important stage in solving energy efficiency issues through the education prism. This article will provide an analysis of the experience of four countries in the field of green construction.*
Keywords: *green constructions, on-line professional skills, MOODLE, learning modules*

Introduction

The world is changing very intensively before our eyes. Today we are witnessing unprecedented social and economic changes, changes brought about

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by rapid globalization and incredible advances in science, technology and technology. If we want to manage and use these changes, we need to prepare for the big challenges they pose to us such as climate change, scarcity of food resources and clean drinking water, endangered ecosystems, and so on (Bräuer et al., 2006; Albers et al., 2011; Carbon Trust, 2005; Architectural Institute of Japan, 2009). The European Union has be set ambitious targets in its climate and energy policy. Europe is faced with the complex task of producing a roadmap for achieving ecologically compatible economic growth (Communication form the commission to the European Parliament).

The concept of the green economy has established itself on a global level in the context of sustainable development as a new environmental policy model. The key message of the concept that environmental protection can not generally be regarded as a cost but - on the contrary - offers great opportunities for economic growth and invites an increase in prosperity and social justice.

By 2020, greenhouse gas emissions and energy consumption are projected to decrease by 20% and the share of renewable energies in electricity consumption to increase to 20%. To achieve the so-called “20-20-20” targets, the construction sector plays an important role as it consumes about 40% of all energy and accounts for more than one third of all harmful greenhouse gases (Niesing, 2011). These data show that the potential for savings in this sector is enormous. In order to achieve these objectives in the construction sector in the coming years, rehabilitation activities at European and national level need to be significantly accelerated. This applies to both new construction, which increasingly requires the construction of low-energy buildings as well as to existing buildings requiring extensive energy renovation (Asif, 2016). However, this task can only be achieved if, in addition to R&D know-how, there are enough workers with the necessary knowledge and skills and with the necessary competence to act on construction sites. Expectations are that demand for workers with such skills in the EU will reach 700,000 in 2020. This is also the reason today to actively work on developing new educational and training modules for the workers in this sector.

Achieving EU objectives for the efficient use of natural resources leads to the use of new materials, techniques, norms and standards in the construction sector that require the acquisition of new skills and competencies of employees in the sector. The main task in this project is in line with the EU Skills Program for Europe, 10.06.2016, and in particular the Green Skills Program. The lack of green skills in the professions in the construction sector is already present and, unfortunately, traditional educational institutions cannot meet this demand. The report considers the possibility of creating within the Erasmus+ project an educational product of 4 interactive multimedia modules to improve the green skills and skills of workers in the construction sector. The Erasmus+ project (No

2017-1- LV01-KA202-035483) is being developed by an international team of 5 partners from 4 countries (Bulgaria, Germany, Hungary, Latvia).

Identification of main topics of the modules for improving the green skills

During the first phase of the project, the latest trends in the rapidly developing construction sector and its needs for workers with appropriate skills in the green sector were analyzed.

According to tasks:

- O1 Analysis of the needs for improvement of professional skills in green construction.
- O2 Define the main themes of the green skills modules.

Based on a survey and analysis of labor market needs in the green skills of construction workers and an analysis of the needs of environmental skills training programs, the project team identified the content of the modules for improving green building competences at a special meeting with all participants in the project.

On the basis of the studies and analyzes carried out in the four European countries by the international project consortium, unanimous agreement was reached: developing the following 4 modules for e-learning in the next phase of the project:

- Materials for green construction.
- Energy efficiency and green technology.
- Passive house technology.
- Glossary “Green construction” - foreign language (Bulgarian, German, Hungarian, Latvian).

Analisys of the WEB wased distance learning environment

This project task was decided at the second stage of the project. In the analysis and evaluation, two of the partners of the Association “European center for education, science and innovations – Bulgaria and iTStudy Kft. - Hungary project was actively involved. They prepared a specialized report that was reviewed at the regular second meeting of the consortium.

Figure 1 ***Two Learning Management System MOODLE and The Blackboard Learning System (i.e., WebCT)***

The study analyzes two platforms Learning Management System (LMS), MOODLE and The Blackboard Learning System (i.e., WebCT) fig.1. Attractive features of consideration are:

- According to the full description, this platform allows it to be adapted to many operating systems (Windows, Linux, Sun and UNIX) and software environment (MySQL, Postgre SQL, MS-SQL Server, Oracle and Access).
- MOODLE can be installed on an institutional server and allows creation and maintenance of courses of different categories stored in a portal page catalog. This can cover a wide range of themes and themes.
- MOODLE supports more services than other courses. The teacher organizes the modules so students can use them. The order is flexible and editing is possible at any time. Available modules are: Assignment, Choice, Forum, Journal, Resource, Quiz and Survey that meet the needs of our course project.
- The available course formats (Weekly, Themes, and Social) provide templates to set the course, making it easier for teachers to design work.
- There are capabilities for uploading files from different formats that allow the use of materials from previous regular courses and easy extension of existing courses. A link to the web directory that contains the files can also be given.
- MOODLE supports multiple languages with the ability to add extra languages.

When choosing an LMS, a reasonable question arises: what's better - a free open source solution that requires further development or an expensive product that's out of the box? This question reveals two common investment factors: starting price and future property costs. Both factors are highly dependent on institutional policies and instructors are expected to use the chosen product. Moodle is a great alternative for those looking for a full-featured LMS with a relatively low cost. But customizing the system to meet specific needs may require significant programming efforts. Blackboard is leading in the LMS industry, but it is expensive.

As far as functionality is concerned, there is no predominance. The Moodle organization for learning content is more transparent and built-in constructivist style. Blackboard seems to require prior training for instructors and students, while Moodle is intuitive and easy to use. These aspects also confirm our preference for using our Moodle development as an Learning Management System fig. 2.

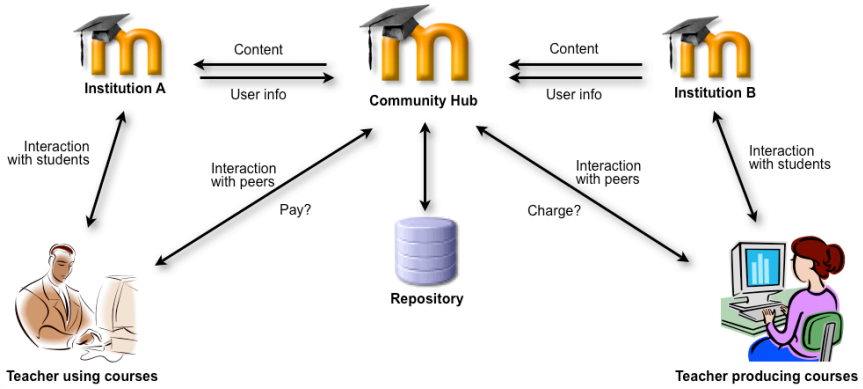

Figure 2 ***The Learning Management System MOODLE***
source: https://wordpress.miracosta.edu/darnaud2/2013/03/18/week-18-the-course-or-learning-management-system/

Methodological concept for the development of learning modules

The structure of the training course and the learning modules in the system MOODLE is selected to have consistency and consistency in the learning process between the modules fig.3. Initial is the “Green Building Materials” (first module) training, which goes on to the topics covered in the second module “Energy Efficiency and Green Building Technologies”. At the third stage of the training are the topics associated with “Passive House” and the contemporary European standards related to the construction of such homes.

The main requirements that led the authors' teams working on creating the learning content of the modules during the third stage of the project are related to the postulates underlying the theory of “Continuing education” of the beneficiaries (construction workers). Continuing education is related to creating and improving conditions for acquiring, expanding and developing interests, personal competences, professional qualifications to improve competitiveness for employment, professional careers and individual development.

The mission of continuing education is to support the professional development and career development of people of all ages by synchronizing their professional competence with European strategies, policies and practices. Consequently, the aim of the continuing training is to create and improve the conditions for acquiring, expanding and developing the professional qualification of the workforce in order to improve the employability, professional careers and individual development.

In the times of constant change, we live in, times of new inventions and developments, happening faster than ever before, we are forced to (almost daily) adapt and continue to learn new things throughout our lives. Learning is not a matter solely for school classes, lectures and exams. Learning is a lifelong

process - we learn be able to adapt to the changes in the environment that surrounds us. Progress is so fast that things are constantly changing. This does not concern only technology - we prepare different foods, the language we are speaking today differs from the language of yesterday, technology is constantly developing. We notice this in our daily lives as well as in our work environment and we are learning continually - consciously or subconsciously. Whether we apply the conscious approach to learning or not is the key element in successful learning. When it comes to formal education, we simply can not imagine that it can take place without our conscious efforts. Here consciousness can be seen as a conscious decision, as to whether our learning is intentional or on the contrary. Ideally a person chooses an approach, which would meet his/her educational needs; he/she would consciously choose the field and the type of training, which are suitable for them. Accordingly, the type of educational program is chosen, and a person seeks ways to apply the newly acquired knowledge in practice. If this does not take place, the overall effect of learning is significantly weakened, and a certain amount of valuable information remains unused. The desire to learn new things and to participate in educational programs varies from person to person. Employers, however, consider lifelong learning one of the most important competencies of their employees. If they want to be successful on the market, they need to employ people who are capable and willing to receive new information, develop independently, participate in different educational programs and accordingly apply successfully everything they have learned in their work, accordingly.

Figure 3 ***Scheme of modules for development and implementation of vocational training under the project***

The purpose of this course and the modules is to improve vocational education and training in the field of green building and enhancing professional skills in environmental construction. The aim is to achieve a change in the workers' approach towards a wise use and management of energy resources and creating a sense of environmental responsibility – which is a prerequisite for providing the green future for future generations.

The methodology of this course developed under the project offered a mixed training model that could help achieve the project goals in the most appropriate way. Combined learning as a method of learning includes elements of distance learning and attendance training, optimally combining the strengths and benefits of each. The use of combined learning is intended to partially address the main task of modern education - with a limited number of teachers to help a large number of learners get the skills they need in the shortest possible time. Combined learning is a flexible technology that combines virtual and direct communication, in which discussions, debates, exchanges of experiences and practices, deep self analysis of parts of the matter through online technologies are held. These allow you to save time actively exercising and learning certain skills and habits in the classroom:

- Combined Learning develops critical thinking and creates skills for independent learning and work, relevant information (exploration, analysis and selection of materials) is used in training and career development.
- In combined learning, training materials are provided not only in print but also in accessible electronic text and / or media option, which allows students to choose individual mode of learning (access to the materials as many times as they need at a convenient time and place).
- Combined learning is interactive, it provides the opportunity for communication “teacher-learner” and “learner-learner”, expression of personal opinion and perspective, exchange of opinions and possibility of changing topic directions in the studied material.
- In combined learning, individual psychological characteristics of the trainee are taken into account, because the combination of various forms of work enable students to express themselves with their different temperament and speed of absorption of matter. Thus, combined learning fits and supports the ideas of personality-oriented approach to training.

The complexity, versatility and multifactoriness of the learning process in learning contexts dictates the need for a methodologically new approach to learning from the standpoint of individualisation of learning. The use of combined learning nowadays is associated with solving the problem of the

individualization of learning, its intensification and optimization. The ability of the online environment to individualize learning, enables a new way to approach the possibilities of using combined learning in the educational process.

Combined learning is the most logical and natural result of the evolution of the traditional model of education. As the name implies, the method is a combination of the traditional model (Without the use of ICT) and e-learning. In other words, this method offers courses, combining innovative tech developments in e-learning and the established by long experience traditional learner - lecturer interaction within the classroom. Combined Learning provides a degree of flexibility and can be adapted to both the outer and the inner conditions, to adapt to the level of development of the individual student and take him to a higher level in accordance with the needs of the system. An important role is also played by the performance of the teaching material. Sometimes the information in the printed publications is old and dated even before they are issued. The electronic component of the course can be updated at any time and the new information could become available in minutes. One of the important elements of training has always been the assessment. In combined learning assessment can be a powerful stimulus for developing the personality and potential of learners. The electronic environment with its automatic testing knowledge gives students a clear picture of the acquired knowledge and skills. In the evaluation process the prevailing component is not control, but the evolving function, i.e., the teacher is able to edit and remodel the task so that to revise and openly discuss the mistakes made by the course students. Such a mode of assessment forms a strong motivation for self-development and self-improvement and significantly reduces the willingness of students to copy and cheat. Modern educational paradigm is oriented towards the development of creative personalities of their active role in the learning process, but it requires certain changes in technology training. The transition to innovative learning technologies provides not so much turning the student into the mere subject of training but also, a person understanding the mechanism of self-learning, raising and boosting self-interest and able to construct their own educational direction. The purpose of the combined learning is giving the students the ability to plan and organize their educational activities targeted to the final result. The students learn to make their own decisions, to make a conscious choice and take responsibility for it. Students learn to search, analyse and contemplate information themselves, and to present the results of their work through various modern technologies. Combined learning fits into the concept of modernization of contemporary education, which is based on introducing new educational standards. The online learning part of the process described above will be implemented through an interactive online platform that should facilitate the key aspects of the model which are:

- group- work,
- access to online resources,
- uploading tools,
- sharing of resources by pupils and teachers,
- collaboration and support by external experts,
- facilities and tools to create original learning materials for both teachers and pupils,
- social networking.

Conclusion

The sustainability of the project activities can be considered in two aspects. On the one hand - this is the effect the project will have in the long term plan and thus the sustainable continuation and development of the activities, the objectives and the project's results at local, regional and European level, and on the other hand - the sustainable development of the project results can be applied to other economic sectors.

Creating a web-based multi-lingual platform for training in the field of ecological construction is in itself a sustainable result, its positive impact increases with time and in the long term period the skills of construction workers increase, the thinking of people for sensible use and management of the energy resources changes.

The implementation of the project results has a long term positive social, educational and economic effect.

The created platform helps increase the number of trained workers, acquainted with the latest ecological innovations in construction and is a prerequisite for ensuring of a "greener" future for the next generations.

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