TEMPUS MEDIS — THE PROJECT OF IMPLEMENTATION OF EUROPEAN EXPERIENCE ON THE USE OF PROBLEM-BASED LEARNING AT THE INSTITUTE OF COMPUTER SYSTEMS OF THE ONPU

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A content of the problem-based learning is highlighted. Integration of the PBL in the modern industrial system control specialists training has been described. Authors declared modern European experience in the field of modern industrial system control specialists training gained in the frames of TEMPUS MEDIS project within which 5 European universities share their experience with six universities in Kazakhstan, Russia and Ukraine.
Keywords: problem-based learning, advanced problem-based learning, industrial control system.

Implementation of the methodology of problem-based learning was carried out at the Department of Information Systems during students' studying based on the master's program.

In accordance with the TEMPUS IV "MEDIS" project materials, the block of subjects was formed, in which the methodology of problem-based learning (PBL) was implemented.

Block of the subjects was focused on the masters training in the development of software industrial systems for industrial processes controlling. The block included the following subjects:

1. Programming of Industrial Computers
2. Programming of Microcomputers
3. Programming of Controllers and Simulators
4. Mobile and Cloud Computing
5. Industrial Networks and Fieldbuses

The motivation for the problem-based learning implementation in the students studying process was as follows. Modern industrial production becomes more and more automated. Hardware resources and software are constantly updating. Therefore, students' design studying of control systems that meet modern requirements becomes more challenging task. One of the approaches for solving this task is the problem-based learning implementation. In its turn, the problem-based learning is not a frozen methodology, but it is developing in course of time.

1. Traditional approach to learning

Up to 90-ies of the last century, the traditional methodology of design studying of control systems met the requirements of industry. It is characterized by the following [1]:

1. Lectures have the key part in training.
2. The course is divided into separate modules studied one after the other with no specific emphasis on their joint usage.
3. The laboratory researches, practical trainings and course works are dedicated to certain topics and are of minor importance.
4. The professor has a central role.
5. The number of students in a group is large (25-30 people).
6. Examinations are the main assessment method.

2. Problem-based learning (PBL)

In connection with the intensification of industry automation in the 90-ies of the last century, the PBL was implemented everywhere. In contrast to the traditional methodology, the PBL puts stress on students' independent acquisition of knowledge as a result of cases solving.

In this case the following basic characteristics of classical PBL can be specified [1]:

1. The main part of the studying is assigned to the cases (problems) solving.
2. Lectures are absent at all, or there is small number of lectures and they relate only to themes connected with the specific cases.
3. The content of the subject is not divided on the themes, but it is integrated into the problem-based cases.
4. The central role of the teacher as a source of knowledge is changed into the role of a tutor, which only monitors the process of the case solving and, if appropriate, aims it in the right direction.
5. Classes are given in small groups.
6. Evaluation of knowledge is not a one-stage in the exam, and has an integrated nature - it is formed in the course of cases execution.

In comparison with the traditional methodology, finding the optimum between the speed of the case solving and the maximum independence of students in solution finding was added to the teacher's functions. Teacher directs independent work of the students, which should break a problem solution into certain issues as a result of regular discussions within the group, to find the necessary information for their solving and then combine them into a global problem solution.

3. Advanced problem-based learning (APBL)

A further increase in the level of complexity and functionality of control systems required the further development of the problem-based learning, which was manifested in the emergence of an advanced problem-based learning (APBL) [2] and the real problem-based learning (RPBL) [3]. The basis of increasing the effectiveness of students studying in the problem-based learning was a parallel study of several related disciplines and execution of cases that can be solved by means of different sets of hardware resources and software.

The role of the teacher in the advanced problem-based learning also changed significantly. In the advanced problem-based learning he is a conductor, which shows at least one way of using the design and modelling environments from the formulation of the task to its solution. After that, the students study on their own additional possibilities of the design environments and find the most efficient options for control systems building.

4. Real problem-based learning (RPBL)

As the APBL supposes the studying cases solving, then, to adapt university graduates to the conditions on the real enterprises, the APBL is complemented by studying according to the RPBL methodology.The main principles here are the following [3]:

1. A real control system is designed for a particular enterprise to be tested and commissioned.
2. The period between the problem statement and the commissioning should be as limited as possible and in no case exceed the scope of the educational process.
3. The goal is to exceed the technical and economic parameters and the functionality of the known industrial analogs.
4. The acquired solution should be worked through as much as possible for the reproduction and commercial realization.
5. There should be worked out either the options for the system's further modernization after its commissioning or the options for designing next generations of similar systems.

The main functions of teachers in the real problem-based learning are as follows:

1. The expert, analysing the reached project level.
2. The organizer and member of the students group, carrying out the project. His tasks include contacting with enterprises-customers and attracting the maximum number of external experts to analyse the project.

5. Conclusions

The steady increase of the complexity and functionality of industrial control systems brings increasing requirement to qualification level of the university graduates. This is the operating mechanism for the problem-based learning development and related complicacy of the teacher's functions in teaching students.

The efficiency of the problem-based learning methodology implementation depends essentially on the qualification of teachers, who are implementing it.

Therefore, for the success of the problem-based learning implementation it is extremely important to improve teachers' qualification both in terms of the problem-based learning methodology and in terms of owning of the latest achievements in the subject area.

One of the options to improve teachers' qualification is the participation in the TEMPUS program projects. An example of such a project is "MEDIS" project [4], in which European universities gave to six universities from Ukraine, Russia and

Kazakhstan the experience of use of the problem-based learning during students studying the design of modern industrial control systems.

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ОФШОРНЫЕ ЗОНЫ КАК ЭЛЕМЕНТ МЕЖДУНАРОДНОГО СОТРУДНИЧЕСТВА

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Рассмотрены особенности современных офшоров, их разновидности и методы влияние на экономику отдельных регионов, а также целесообразность их использования в глобальной экономической системе, как механизма интенсификации экономического развития депрессивных и отсталых регионов, стран, систем.

Ключевые слова: офшоры, международные проекты

Введение. Развитие постиндустриального общества направлено на выравнивание экономик отдельных стран и регионов в глобальной экономической системе.