Project-based method in the organization of educational activities

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Abstract. In recent decades, there has been a surge in interest in the design method. In many countries, it is now seen as an innovative approach to science and technology education. The article investigates a model based on the projects method that extend the capabilities of the theory in the successful fostering of students’ self-improvement and self-development; determines the main conditions of its implementation; selection criteria and its effectiveness indicators; the necessity and possibility to modernize the educational training of future specialists. The relevance of the research problem is conditional upon the fact that the transition to new educational standards, which poses new challenges for the graduate school, that provides cognitive activity and independent thinking of students and overcoming the reproductive style of learning requires an appropriate method. The project method is becoming more widespread in teaching practice, involving the solution of relevant and interesting problem for the trainees. The article identified socio-economic background of using the project method in the training system of highly qualified specialists. Basic criteria (valued attitude to the project activity; creativity in design and the performance of project activities) and indicators estimated the level in professional competence of the project activities. Identified and justified by organizational and educational conditions of using the project method, training specialist at the University. Since the traditional education system, which is based on the assignment of ready-made knowledge, reduces to the solution of theoretical and practical problems, specific algorithms and schemes, little oriented to the students self-improvement and self-development, the task of finding the effective ways to solve problems of the qualitative training of highly qualified specialists goes to a new level.

1. Introduction

The new social and economic conditions for the world community development have led to a change in the requirements for professional training of specialists, who must have a high professional competence, be able to independently acquire the new knowledge, think creatively, be able to find the optimal solutions in unusual situations, and have the ability to innovative activities. The education system faces with the problem of qualitative training of the competitive competent specialists of a new level, who are oriented to the personal self-improvement and professional growth.
The project method, which is also discussed under the headings of project work, project approach, and project learning, is one of the standard teaching methods. It is a subformation of action-oriented learning and learning-oriented learning and a company in which children solve practical problems over a period of time.[1]

The application of modern teaching methods nowadays means especially effective use of modern digital technologies and the effective use of digital learning materials. Digital technology is supporting the education process for some time project-based method in the organization of educational activities.[2]

2. Materials

The methods of network analysis are essential in designing and improving large and complex systems, as well as in the search for ways of their most rational use. Thus, the task of applying the network analysis methods becomes relevant to obtain and evaluate the deterministic characteristics of information processing in the information handling of automated process control system [3].

The transition to new educational standards poses new challenges for the university: the search for and introduction of educational technologies, mechanisms, methods of training into the educational process that ensure the formation of competitive specialists, who satisfy the requirements of modern labor market. Since the traditional educational system is based on the translation of ready-made knowledge, reduces to the solution of theoretical and practical problems with the given algorithms and schemes, and is little oriented to the students self-improvement and self-development, the problem of finding the effective ways to solve problems of the qualitative training of highly professional specialists of a new level arises.

3. Results and discussion

Innovative training is a current trend in vocational education. There are many innovative teaching methods that include different approaches and methods. Nevertheless, the essence of any innovative science remains unchanged - practical knowledge and a deep and comprehensive understanding of the company's activities.[3]

Innovative thinking is a special type of learning, the main task of which is to develop more critical thinking.

One of such mechanisms is the project-based method, being an educational technology, includes a set of research, searching, and problem methods, which are creative in their very essence.

The term "Project" (in Latin "projects") means "thrown forward", and in the dictionaries is defined as "plan, design, prototype, fore type of an object, type of activity".[4]

In the educational papers, the project-based method is considered in various meanings: as a teaching method, as a mode of study, as kind of educational activities, as the means of managing the cognitive activities, and as the means of organizing the independent work of students.

In the educational process, the project-based method or the problem-solving method has been applied in the USA in the 20-es of the 20th century. The founder of "pragmatic pedagogy" J. Dewey and his followers H. Parhurst and V. Kilpatrick, believed that any activity aimed at solving any problem, performed "with all one’s heart", independently with a group of children united by a common interest, promoting the development of intellectual interest, could be called the project.[4,5,6]

In Russia, the idea of project-based training has appeared almost in parallel with the developments of American educators. Thus, in 1905 the Russian educator S.T. Shatsky organized a group of employees, who functionally used the project-based methods in the educational activities. [6,7]

In Soviet times, the ideas of project-based training were widely practiced, the project-based method was found appropriate to the goals of building the socialism and was declared "the only way to transform the school of study into a school of life and work" However, the universalization of this method and the rejection of systematic study of the subjects have led to a decrease in the level of knowledge among students, the project-based method was found ineffective and excluded from the school practice.
Today we can see a new revival of the project-based method, which is associated with the development of computer telecommunication technologies; the project activities begin to occupy an important place not only in the general education system, but also in the higher education system, allowing the student to acquire the skills that are not achieved with the traditional training methods. Many of the leading educators believe that the project-based method is one of the most effective methods of enhancing the cognitive and creative abilities of students, and forming the professional competence. According to E.S. Polat, the project activities of students is "the consideration of long-forgotten old educational truths used earlier in other conditions and in a different interpretation under a new turn of educational, social and cultural achievements" [3].

In the modern system of higher education, the project-based method is used as a component of the training system and represents such organization of the students' independent activities, which are aimed at solving a problem, and achieving a certain result. The project activities of students are focused on revealing the personality of trainee, developing an interest in learning activities, developing the intellectual and creative abilities in the process of problem solving.

According to many researchers, including Veenman, the project-based method is a personal-oriented technology that allows the students to organize the independent activities aimed at solving the tasks of educational project, integrating the problem approach, group methods, and reflexive, search and research, communicative techniques. [10]

By analyzing the educational literature, all possible approaches to the concept of project-based method, we can conclude that the organization of project activities of the students is aimed at the formation of skills to independently acquire the knowledge, to obtain the professional competencies, and the objectives of project activities of the students include:

- systematization, consolidation, deepening of the theoretical knowledge and skills obtained by the students;
- consolidation and development of the practical skills obtained;
- development of the students’ cognitive and creative abilities;
- creative thinking, self-development and self-improvement abilities.

Based on the objectives, the different types of projects are used in the learning process, the choice of which shall be adequate to the content of academic disciplines studied, and the level of students’ preparedness. E.S. Polat notes that the organization of project activities directly depends on the type of project and distinguishes the following typological features of the projects [9]:

- Dominant activities in the project: research, search, creative, role-playing, applied (practice-oriented), fact-finding oriented, etc.
- Subject-matter area; Mono-project (within the same field of knowledge; of the following types: Literary and Artistic, Natural Science, Environmental, Linguistic, and Cultural Studies, Sports, Geography, History, Music); Interdisciplinary project (includes several disciplines).
- Nature of the project coordination: direct (rigid, flexible), hidden (implicit that simulates a project participant).
- Nature of the communications: domestic or regional (among the participants of one educational institution, region, country, different countries of the world) and international (project participants are representatives of different countries).
- Number of the project participants: personal (between two partners), paired (between the pairs of participants), group (between the groups of participants).
- Duration of the project: short-term - suggests the solution of small problem), average duration (from a week to a month), long-term (from a month to several months).
Taking into account the allocated typological features, E.S. Polat defines the following main types of projects:

- **Research projects**, which represent the scientific research work, with the definition of conceptual apparatus
- **Information projects**, which are aimed at collecting, analyzing and summarizing the information necessary to define some conclusions, results.
- **Creative projects**, which are aimed at developing the creative abilities of students.
- **Telecommunication (IT) projects**, which represent the combined educational and cognitive, creative activities of trainees on the basis of computer communication;
- **Applied projects** - are characterized by a clearly defined result of the participants' activities from day one, which is focused on their social interests; have a clear structure, a script, the allocated roles.

Analysis of the references on the methodology of educational design makes it possible to conclude that the process of project creation must obey a certain logic, and it is most advisable to include the following stages in it: a) choice of the topic; b) development and organization of the project plan; c) implementation of the planned project activities; d) presentation of the project; e) evaluation and analysis of the results.

**Choice of the topic.** The topic should be a person-oriented, close to a student, aimed at developing his/her professional and personal qualities, general and professional skills. The choice of subject matter should be subordinated to the specific learning situations, professional interests and abilities of the students, requiring the integrated knowledge, the application of projective research skills, creative thinking.

In the project activities, an important stage is development and organization of the project implementation plan. At this stage, the students, with the help of their teacher, formulate the problem, determine the purpose of work on the project, draw up an action plan, identify the sources of information, distribute the functions, organize the working groups, define the forms for presenting the project results.

**Implementation of the project activities.** At this stage, the students collect the necessary information, analyze it, select and structure the material in accordance with the set plan, work on the creation of project product, and prepare for the presentation.

**Project presentation.** The students present their work performed within the project: analyze their activities; present a way of solving the project problem by using the techniques of introspection and reflection. At this stage, the students develop the skills to logically build their thoughts, briefly present them, form the skills of public speaking.

**Evaluation and analysis of the results.** During the discussion of the results of work on the project, the advantages and disadvantages of project are revealed; the project activities are evaluated by the students and the teacher. The teacher draws conclusions, summarizes the results, and gives a final assessment of the project.

In the course of project there should be a constant interaction between the teacher and the students. The main role of teacher is to conduct consultations, monitor the quality of project implementation by the students, and to control the independent work of students. The teacher organizes the project activities of students through the dialogue, creative interaction and cooperation. The subject of project activities is the student, and in the course of project work he plays an active role.

According to E.S. Polat, the project-based method is a way of developmental teaching, which is based on the development of cognitive skills of the students, the abilities to independently design their own knowledge and navigate in the information space. [8]

Researches in the field of Psychology by D.S. Bruner, L.S. Vygotsky, and et al. show the effectiveness of impact of the project activities on the activation and formation of cognitive activities. Due to its didactic essence, the project-based method allows solving the problems of formation and development of the logical, algorithmic, critical and creative thinking of students.[9]

In addition, the project activity, according to Veenman, forms such important personal qualities as communication skills, tolerance, cooperation, which is necessary in the subsequent professional activities. [10]
Educational effectiveness of the training project-based method can be represented by figure 1.

The training project-based method contributes the development of the student's independence, all spheres of his/her personality, ensures his/her subjectivity in the educational process, therefore, the project-based training can be considered as the means of activating the cognitive activities of students, the means of improving the quality of educational process. Thus, today the project-based method is understood not only as one of the ways to organize the interrelated activities between the teacher and the students (the "teaching method"), but also as an integral "educational technology" that:

a) Presupposes the possibility of diagnostic goal setting, planning and designing the training process, phased diagnostics, varying the means and methods to correct the results;

b) includes a reasonable system of methods and forms of activities for the teacher and the students at various stages of the training project implementation, and formulated criteria for assessing the results of these activities;

Figure 1. Educational effectiveness of the project-based method.
c) is applied at studying of various disciplines both in the higher educational institutions and in other educational institutions.

4. Conclusion
The conducted analysis of essence of the project-based method allowed us to conclude that the project work of students contributes to the activation of cognitive activities, the development of creative abilities of the students, the formation of professional competence, the development of independence, and the growth of personal qualities, and it should be used in the educational process of higher education school as a mechanism for the formation of highly qualified specialist, who satisfies the requirements of modern society.

Project-based learning takes into account the essential features of what we value most in education and puts them at the center of our formal learning environment. It is a popular and noble endeavor by educators to inspire and develop learners throughout their lives. Undoubtedly PBL helps prepare students for the "real world", so of course wherever they study. [11]

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