Organization of Educational and Research Project Activity of University Students

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Abstract

The purpose of this article is aimed at forms and methods' improvement of university students' training which facilitates active learning activities. The presented article shows the development of cognitive and creative students' skills in project research activities on case professional problems tasks' solving. The basis of the presented work is the ideas of competence-based, student-activity and design approaches that contribute to the pedagogical principles of educational projects' development. The authors developed a classification of educational projects and the algorithm of teachers' and students' actions during project work within the modules. This article is intended for educators, researchers, managers of educational organizations of higher education who are engaged in the design of the learning content and the development of educational technology in higher education.

Keywords: higher education, competency approach, project approach, project method, case professional activity

1. Introduction

1.1 Background

The higher education system is undergoing a phase of modernization caused by changes in socio-economic and political life of society.

This stage of science-intensive industries development doesn't require from students just mechanical, monotonous fulfillment of the work, but requires the use of elements of research and development activities at each workplace to solve business challenges, for better workflow-management, to ensure the productive workforce members' interaction. Research and design skills, as an element of professional education, develop management qualities: being initiative, resourcefulness, high social and industrial adaptation of graduates of technical specialties.

There is inconsistency manifestation in modern teaching practice of students' training-research design training's content to the labor market's demands that require modification of the methodological and substantive foundations of educational research.

1.2 Status of a Problem

In the modern scientific and pedagogical literature, there are prerequisites to solve the identified problems: professional competence's formation problems are revealed (Zeer, 2005; Zimnya, 2006; Ibragimov, 2011; Matushansky, 2011; Mukhametzyanova, 2010; Hutorskoy, 2003, Levina, Prokofieva, Zagrebina, 2015, etc.); the structure and content's design of training, educational-methodical provision of training in professional educational organizations are studied (Bezrukov, 1994; Matukhin, 2012; Mukhametzyanova,2012; Safin, 2012; Chitalin, 2008; Gutman et al., 2014; Lopatina et al., 2015, etc.).

The essence of the concept "project approach" is associated with such scientific concepts as "project", "design", having a different nature from the point of view of different branches of scientific knowledge, and from the point of view of different levels of the science methodology. V. I. Slobodchikov (2006) considers design as a growing process of teachers' communities' new forms, new content and educational technologies. V. V. Davydov (1989) defines design as a mechanism of transition from past to future, as a means of theoretical-active approach that allows to manage different social spheres. V. F. Aitov (2006) propose to consider the project approach as training leading, dominant strategy implementation, which serves as the basis for the educational process organization in which all participants make independent targeted searches, processing and updating of knowledge. I. A. Kolesnikova and P. M. Gorchakova (2005) consider the project approach as an approach designed for a specific target audience (students, teachers).

1.3 Conceptual Provisions

The project approach is innovative direction in addressing the strategic objectives of the FSES of HPE (Federal state educational standards of high professional education), in the management of scientific-methodical activity of teachers, implementing ways to achieve didactic goals through detailed study of the problem, purpose, situation and real, tangible practical results, prepared for implementation in the educational process. Innovation of project approach in the management of students' educational and research activity means the integration of the system, activity, axiological, activities' rethinking of the teaching staff (lecturers), structured on the base of projects' hierarchy of different complexity (Polat, 2000).

2. Materials and Methods

2.1 The Technology of Problem-Based Learning in the Students' Educational Research Project Activity

The technology of problem-based learning is based on the theoretical positions of the American philosopher, psychologist and educator D. Dewey (Schilpp, 1939). Today, under problem-based learning is understood such organization of training sessions, which involves the creation of problem situations under the supervision of the adviser and active independent activity of pupils on their solution, resulting to creative mastery of professional knowledge, skills, abilities and development of cognitive abilities. Problem-based learning as a creative process is represented as the solution of unusual scientific and educational tasks by non-standard methods. The main psycho-pedagogical goal of problem-based learning − the development of cognitive and creative abilities of students.

Depending on the level of students' personal readiness types of research activities can be differentiated on the following levels:

1st level (introductory) - teacher poses the problem, formulates and directs the students' activity in its decision. This level is used at the beginning of special subjects' study, when the level of development of professional knowledge is low and students are not able independently to work on it. For example, at the beginning of the lecture, students are encouraged to listen to the new training material carefully and at the end of his or her presentation to suggest their own definition of revisited professional concepts. And the teacher, summarizing all the answers, give the correct definition, which students should learn.

2nd level (reproductive) − the teacher indicates a problem and students independently formulate and solve it. This model is used when there is sufficient accumulation of professional knowledge and students are ready to work independently on a simple problem situations in groups or individually. This level is used when performing practical work and students are invited to resolve a particular situation on manufacture basing on their theoretical knowledge.

3rd level (productive) − students discover themselves, formulate and solve the problem. At this level, students go when they are ready for transfer knowledge in future professional activity. This level is applied while independent activity of students on a specific topic studying, followed by paper, report, presentation defending, as well as while all types of industrial practice, when students independently examine certain issues related to the peculiarities of professional activity at the main enterprises in accordance with the subject of manufacture practices.

The most effectively problem-based learning is implemented through the students' research work during the course and diploma projects doing, as well as comprehensive practical work fulfilling, during which they undergo all the stages of professional thinking forming.

2.2 Projects' Method

Problem-based learning technology is complemented by projects method, allowing unleash the students'

creativity to transfer acquired knowledge and developed competencies in practical activity. According to the definition given by doctor of pedagogical Sciences E. Polat (2000), project-based learning is "a way to achieve didactic goals through detailed elaboration of the problem (technology), which should be completed by very real, tangible, practical result, formed in one way or another. When designing most of the work falls on the shoulders of the student, starting from the project's topic choosing, the problem formulation and finishing with the implementation of the project presentation and the undertaken activities analysis. As for teacher- he acts more as a consultant. He directs the activities of the learners, motivates them, raises questions, makes them think, take a self-assessment activity.

The goal of project-based learning is to create conditions under which students acquire the missing knowledge from different sources; learn to use the acquired knowledge to solve cognitive and practical tasks; develop effective communication skills, working in groups (teams). Research skills (problems identifying, information collecting, observation, experiment conducting, problem analysis, hypothesis proposing and generalization) are formed in students; systematic thinking, attention, imagination and memory are developed (Zakirova, 2014).

Project method technology application can successfully solve the following difficulties and learning problems: low motivation to learn; low cognitive activity; low practical orientation of the educational process; self-realization mechanism formation; the ability to integrate knowledge from all areas.

2.3 Projects' Implementation in the Research Activity of University Students

Project research activity of students is understood as "a kind of educational-cognitive activity that integrates components of project and research activities in itself, while the leading activity remains the design of educational, case professional and professional facilities, each stage of which is accompanied by the study, an independent search for subjectively and objectively new knowledge as about the object of design so about the ways of design problems solving" (Shakuta, 2014; Masalimova et al., 2014).

However, the authors believe that the integration of the two activities is not enough and there is a need not only to strengthen the development of research projects, but to offer in accordance with the capabilities of the student to design the project from the idea stage and prediction to the final result of its implementation, shaping new ways of working in case professional field.

In the organization of research activities the following classification of project activities are used:

1. According the degree of student's participation in the project: individual, pair and group. These are course and diploma projects, integrated practical work and research projects in the framework of the interdisciplinary courses' topics.

2. Projects based on the dominant activity of students: 1) research (research of any problems according all the rules of scientific research) is a comprehensive, practical work, course and diploma projects; 2) information (collecting and processing of information on relevant problem with the aim to present it to a wide audience – report, abstract, etc.).

3. On the complexity of the projects, which are implemented in the framework of the organizational management module, are interdisciplinary. They cover both technical and economic disciplines.

4. By contacts' nature there are projects which are carried out within the framework of the organizational management module and they are intra-group one.

5. According the duration of the project in organizational management module there are: short-term projects − 4-5 classes (complex practical work); weekly projects that require for project implementation 30-40 hours (course design). It is assumed the combination of classroom and extracurricular forms of work.

3. Results

3.1 The Stages of the Research Project

When the project implementing goals and objectives, object and subject of the project, references, theoretical and practical significance in any field of knowledge or professional activity are denoted, it is necessary to specify what purposes of student's intellectual, moral, and cultural development in this case are reached, the deadline of the project; the composition of the group; the order of project results' forming.

Projects are carried out in three stages:

- preparatory (research) – this is the stage of collecting, studying, generalization and systematization of theoretical knowledge by studying various sources of information (academic, special and reference materials, regulations, official instructions and regulations that govern the activities of the enterprise, etc.);

-technological – the stage of object, subject, purpose and the hypothesis of the research identifying; a description of the project in accordance with the requirements of state standards (shaping in accordance with the requirements to tables, charts, graphs; preparation of presentation material);

- final check of the project- preparation for protection (overcurrent) and the actual defending.

Each stage of work on the project has its own specific result. The design of the project includes: the theme, the subject, the nature of the project (interdisciplinary), the aim and objectives of the project. Implemented projects are publicly discussed and protected by the students. Protection is provided in the form of a scientific report or press conference using multimedia presentations.

When designing such complex practical work the entire scope of work is divided into stages, which the student can perform consistently, but so that it would be impossible to jump over the stage, or to perform them in a random order.

Projects in the framework of professional training solve economic planning, organizational and administrative tasks and tasks of educational research. In the design process the transfer of theoretical knowledge to a professional angle occurs. The student get a complete view of what his future professional activities will be consist of. In the process of project preparation the student independently studies various sources of information, which is necessary for preparation of the project: special, periodical literature, regulatory documents, electronic databases and the official sites of companies. All the information is systematized and presented in a certain form in accordance with state standards.

In the process of implementation of project activities the teacher acts as a tutor, directing, suggesting to the student that he needs to do, in what sequence, where better to look for the information, checking the quality and timeliness of work fulfillment, etc.

Projects publicly are protected by the student with the use of multimedia presentations, which reflect the main goals, objectives, object, subject of research, an outline of work, etc. Presented on the protection students and teachers, act as opponents, asking questions and questioning conclusions, etc. This form of presentation allows the student to master professional terminology, to develop a culture of speech, learn how to seek for information, process and apply information obtained from a variety of sources, to defend his point of view, which contributes to the development of his or her competencies and preparation for professional activity.

Final thesis project solves professional (engineering or Humanities), design, planning and organizational and administrative tasks and tasks of educational research. The design of the project includes a theme, reflecting the interdisciplinary nature of the project, the purpose and objectives of the project.

Diploma design is an interdisciplinary research project. This means that during the fulfillment of the research project, the student would possess knowledge in several disciplines. This is a complex, creative, exploratory research, which requires the updating of all the powers of the student. It is clearly shown the connection between theoretical and practical training, technical and economic disciplines, theory and practice of professional activity, which is very important for students' understanding of their future professional activity. This work systematizes the knowledge of the student and provides an opportunity to assess the quality of mastering of knowledge, skills and competencies.

3.2 The Algorithm of Entities' Actions in Educational Process

The actions of the teacher and students at different stages of work on a research project are presented in Table 1.

Table 1. Joint actions of the teacher and students in the process of project implementation

Stages	Teacher's activity	Student's activity
Preparatory stage		
Project's theme choosing	The teacher suggests possible topics to students and examines topics proposed by students.	Students discuss proposed by the teacher themes, offer their own versions.
The allocation of sub-topics within the selected themes of the project	The teacher pre-determines the sub-themes in the theme of the project	Each student receives a dedicated sub-themes or offer his or her own versions of splitting the topics into subtopics.
Creative groups forming	The teacher carries out organizational work in uniting the students in the creative group, team, etc.	Students independently determine their roles within creative teams.
Activity algorithm development	The teacher develops tasks, questions for search activities and recommends sources (academic and professional literature, periodical literature, websites, etc.).	Students participate in tasks' development. Questions to answer can be produced in teams followed by a discussion by the group.
Definition reporting forms on the results of this project	The teacher participates in the discussion of the results obtained in the course of the project, offers options for the presentation of the results of research.	Students in the working groups discuss the presentation forms of research results: report, conference, presentation.
Organization of work on the project	The teacher observes, coordinates, advises on the work of students and stimulates their activity.	Students carry out search activities, study all available sources of information, systematizing the information.
Technological stage		
Stages	Teacher's activity	Student's activity
Results' forming	The teacher observes, coordinates, advises on the work of students, stimulates their activity.	Students in creative groups draw up the results of work on previously agreed rules.
Overcurrent of projects	The teacher organizes the examination (examination may be performed by an expert – the teacher or teacher of related disciplines; and several experts – they may be students assigned to this position).	Students report about the results of work, present their work in a previously agreed form for the examination.
The conclusion stage		
The results' presentation	The teacher organizes the defense - invites students of other groups and teachers; prepares technical means; monitors the rules.	Students present and defend their projects.
Reflection	The teacher evaluates defender's activities and the activities of students on the quality of the assessments and students' activities.	Summarizing, students express wishes, collectively discuss estimates for work performed.

3.3 Evaluation System of the Research Project's Results of the Student

The results' assessment of the research project's development is established in the following way: 1) Teacher's or teaching staff's evaluation, depending on the scale of the project; 2) assessment of students; 3) self-esteem. The efficiency of all projects is reflected in a specially designed diary projects (within Moodle system) so that the instructor and the student could record achievements, an assessment of the changes could be carried out and position monitoring could be fulfilled, and so on.

For each implemented criterion of the project the level (high, medium, low) is assessed, in case of absence (or poor implementation) of even a single criterion, the project is not accepted. The criteria are: relevance of the topic of the project, the practical value, theoretical argumentation of the provisions, the choice of research methods, the representativeness of the results, the level of provision of material, scientific and logical, communication (for group projects), organization of discussions, the level of project report, implementation of the project in practice.

4 Discussions

On the basis of the work done, we can draw the following conclusions:

1) to improve the effectiveness of a professional orientation of educational process in high school is possible through the introduction of research projects in educational activity of students;

2) to implement the projects' method is necessary to develop an algorithm of actions of teacher and students in the vocational subject area;

3) as a means of monitoring for training project activities it is recommended to use the "diary of projects", which is a means for diagnosis, evaluation, introspection and further correction of work performed;

4) in the implementation of projects throughout the period of study a positive development of all component of professional and cultural competence of students was observed;

All the above mentioned arguments show that the project activity in research teaching of students is an effective pedagogical tool for learning.

5. Conclusions

Conducted by the authors the pedagogical experiment on the systematic implementation of projects in educational and research activity of students throughout the period of professional training at a University (bachelor), approved on technical (information focus) and economics specialties showed that the projects' method implementation results to positions' change of teacher and student, realizing the transition to entity-entity relations, changing psychological climate, motivating the students, improving relationships among students and teachers. Priority of research and creative activity leads to high integration of disciplines, to interdisciplinary knowledge in the professional field and the skills which form the foundation of formation of professional and cultural competences. Activity based learning such as project-based learning, promotes the development of intellectual, communicative and creative skills as well as helps to develop such character traits as responsibility, curiosity, commitment, perseverance, tolerance, ability to work in a team.

Acknowledgments

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