PROJECT TECHNOLOGY IN THE CONTEXT OF THE COMPETENCE SYSTEM FOR TRAINING EDUCATORS

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Summary

The article presents the results of a theoretical and practical study on the issue of using project technologies in the system of professional training for future teachers. The emphasis is placed on defining the essence of project technology through positioning its target orientation, basic characteristics identified through the theoretical study of the problem. The results of the research on the level of student's ability/readiness for project activity are presented based on basic quality criteria, and the dependencies identified in their context are interpreted.

Based on the generalization of the process and results of experimental learning, the authors substantiate approaches to adequately organizing the educational activities of future teachers, concerning various formats of using project technologies in the context of the educational process. Examples of educational tasks in the framework of studying the academic discipline "Project technologies" are demonstrated, and the main accents of the process of ensuring adequate content and methodological support for the use of project technologies are highlighted.

Key words: project; Project technologies; competence education; subject-subject relationships.

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1. Introduction

Project-based learning, the use of project technologies in professional training systems, is becoming increasingly relevant. It aligns with modern educational standards associated with the development of key competencies required for effectively solving problems in constantly changing situations. The term "project-based world" also indicates the scale of the problem. The need for understanding the basics of project design in general, and specifically within the professional activities of future educators, is primarily driven by the fact that project technology has a wide range of applications at all levels of the education system. Teachers, in particular, can utilize various forms of project design: a) In organizing educational activities for students; b) In developing and implementing work forms and events that aim to achieve specific outcomes that can be implemented in practice; c) In the process of sociocultural design, which allows for the scientifically substantiated formation of the educational environment and ensures the social adaptation of students; d) In individual trajectories of professional self-development, both within the framework of professional development and beyond (holistically, throughout life).

Project technologies hold particular value during the transition to innovative educational standards, which are based on competency-based education technologies. The processes of acquiring competency-based education and project technologies by future teachers are interrelated and mutually reinforcing. Mastery of project technologies enhances the development of integrated, general, and professional competencies in accordance with higher education

standards. Conversely, the higher the level of formed competencies, the more effective the process of acquiring project technologies becomes.

It is important to find out the essence of Design Technologies, and their basic characteristics, to correctly approach the design process, focusing on key/system-forming quality indicators. This is since in the practice of educational activities there is a fairly active use of these technologies, a significant number of which are presented in information sources. The problem is that various information sources contain a significant number of authors' projects, which are not such because they do not meet their main characteristics and quality criteria.

The results of theoretical research and analysis of the practical implementation of project technologies in professional education systems demonstrate that, despite positive trends towards increasing the importance of innovative technologies, there are instances of formalism in their practical application. There are many reasons for this, but the most common problem is the design of educational activities based on information and reproductive education, the system of subject-object relationships in its structure. The main contradiction lies in the fact that innovative technologies, which include project technologies, are implemented only based on personal, competence-oriented education, and subject-subject relationships of its participants.

Indeed, the use of project technologies based on innovative/competency-based approaches can provoke a conflict with the traditional information-reproductive system of organizing activities. As a result, we have a significant number of projects that are created as projects in terms of form, but they are not such in terms of meaning, functional content, or characteristic features. The correct use of project technologies in the professional education system requires a systematic understanding of their essence, goals, and functional characteristics, as well as the specific structural organization based on them. This understanding helps prevent the manifestation of formalism or imitative practices in their practical application.

The purpose of the article/investigation is to analyze the essence of project technologies, identify their target orientation and basic characteristics, and justify the features of implementation in the process of experimental training.

The following methods were used in the investigation:

Theoretical (analysis, comparison, synthesis), based on the results of which: the essence of project technologies was analyzed through a comparative analysis of various researchers' positions, the purposes of their use in the process of professional training of future educators were substantiated, and the leading characteristics were identified, which became the basis for determining the basic quality criteria.

Forecasting and modelling methods, which served as the basis for the development of the training course, the definition of its content and technological content and an integrated approach to the organization of the educational process.

Diagnostic methods (questionnaires, testing, essays, methods of mathematical statistics) were used to determine the actual state and problems of readiness of future educators to use project technologies. These methods helped to assess the effectiveness of the educational course developed based on the aforementioned theoretical positions.

2. Conceptual and Theoretical Foundations of Project-Based Technologies

Project technologies in education) regardless of the level) are the subject of research by various scientists (e.g., Bashinska (2013), O. Borodienko (2020), L. Dovgan (2017), V. Pochuyeva (2021), V. Priymak (2021), T. Silakova (2017), H. Romanova (2019), V. Radkevych (2020), Z. Ryabova (2005), T. Panayotova (2012), K. Semyzorova (2012), J. Dewey

(1935), W. Kilpatrick (1935), M. Knoll (1993), R. Howell (2003), who interpret the essence of the concept, focusing on aspects that are the object of scientific research for them. Thus, the founders of the project method, American Scientists Dewey and Kilpatrick, justifying the project method, focused on the activity of the subject of training, and the practical value of the acquired knowledge. They proposed building education on an active basis, through practical student activities, focusing on their personal interests and the practical relevance of the knowledge acquired for their future lives *(Knoll, 1993: 58–63)*.

R. Howell systematically explores the problem of projects in the context of ensuring an interactive form of activity, the realism of problems that group members work on. "The project method is an organized approach to learning in collaboration, in which students acquire and utilize knowledge and skills to solve real problems through thorough investigation" *(Howell, 2003: 13)*. V. Killpatrick considered project technology based on the fact that" education is life, not preparation for life " *(Kilpatrick, 1935: 161–167)*

Researcher T. Silakova characterizes the essence of project technologies, proving the importance of harmonizing theory and practice, and combining academic knowledge with practical ones. In particular, it states that "the essence of project technology is to stimulate students' interest in specific problems that require a certain amount of knowledge, and through project activities involving the solution of one or a series of problems, demonstrate the practical application of acquired knowledge from theory to practice, harmoniously combining academic knowledge with pragmatic ones, maintaining an appropriate balance at each stage of learning" *(Silakova, 2017: 153–158)*.

The authors of the practical guide "Project Activity in the System of Vocational (Professional-Technical) Education" delve into the activity aspect of project-based technologies in more detail, which involves a certain level of process structuring. They define a project as "a set of purposeful, change-related, and temporally sequenced, one-time, comprehensive actions (measures or works), aimed at achieving a final result under conditions of limited resources and specified start and completion dates" *(Radkevych, Borodienko, Pukhovska, Samoilenko, Radkevych, Bazeliuk, 2020: 12)*.

Researcher T. Dovbenko puts the result component as the basis for the quality of project activity and pays attention to the final "product" of the project implementation, which can be seen and evaluated from the point of view of practical use. The method of projects is based on the idea that reflects the essence of the concept of a "project" and its pragmatic orientation towards the result obtained when solving a practical or theoretically significant problem. The main thing is that this result can be seen, understood, and applied in real practical activities. To achieve such a result, one must possess the ability to think independently, and identify and solve problems, utilizing knowledge from various fields. It requires the capacity to predict outcomes and potential consequences of different problem-solving approaches, as well as establish cause-and-effect relationships *(Dovbenko, 2005: 47–52)*.

We consider the approach valuable, according to which attention is focused on the formation of metasubject characteristics in the process of working on projects and their gradual development. In particular, the project method is interpreted by V. Pochuyeva as "a means of learning when students acquire knowledge, skills and abilities, as well as metaprofessional qualities in the process of planning and performing practical tasks that are gradually becoming more complex" *(Pochuyeva, 2021: 448–452)*.

The analysis of definitions of the concept of "project" by domestic and foreign authors has made it possible to identify its fundamental characteristics, among which the most significant ones are:

– Practice-oriented approach, which involves directing activities to solve specific goals that are necessary and of practical significance;

– The purposefulness of the project, which is implemented through setting precise goals, which should be characterized by measurability and positioning of the expected results;

– Clear logic and step-by-step actions in the framework of transforming the set goals into project results;

– The uniqueness of the project, which is related to a specific situation, its characteristic features;

– The adaptability of the project, according to which the transfer of the method of solving the problem to other conditions requires taking into account their specifics and the corresponding approval period;

– Time constraints, according to which it is necessary to accurately calculate the process and its structural organization;

– Focus on the available resource base and content and technological opportunities that can be used within the project;

– The ability to maintain a balance between theoretical and practical knowledge at every stage of training;

– Availability of mobile diagnostic tools that make it possible to "measure" the effectiveness of project activities, identify achievements and weaknesses;

– The presence of an analytical and reflexive component makes it possible to comprehensively understand the effectiveness of activities so that the development of the next project can take into account the work experience gained.

3. Strategic Goals of Implementing Project-Based Technologies in the Context of Competency-Based Education

The analysis of theoretical sources on competency-based education issues and the practical use of project-based technologies in educational activities at various levels has allowed for the identification of a complex set of goals for the active implementation of project-based technologies. These goals are considered the most significant for the current stage of professional education development and the adherence to modern higher education standards:

– transformation of the basic standards of European education into a national system, among which the values of personality-oriented, competence-based education are of particular importance;

– increasing the level of practice orientation of educational activities, strengthening the integration of theory and practice in the professional education system;

– Increasing the level of utilization of the research component within the structure of educational activities involves a comprehensive analysis of the problem within a defined context. It includes forecasting and designing effective solutions, as well as conducting diagnostic measurements at various stages of project implementation.

– ensuring the possibility of designing an individual educational trajectory in the process of professional development of a future specialist;

– training a specialist with a high level of competitiveness who can not only effectively solve professional problems in situations that are constantly changing

– development of the ability to work in teams with effective forms of cooperation and constructive communication, a clear distribution of functions, and the subject-subject nature of relationships between project performers.

4. Research Methodology and Experimental Design

Based on the aforementioned characteristics and goals of project-based activities, a criterion-based diagnostic framework was developed, enabling the assessment of the actual readiness level of master's level students for project-based activities. The criteria were grouped into four blocks, which allowed for the diagnosis of the following aspects: 1) Knowledge of the competency model of education (innovative block). 2) Attitude towards project-based activities as an effective method of implementation (motivational block). 3) Knowledge of theoretical and practical foundations of project-based activities (cognitive block). 4) Readiness for project-based activities (personal characteristics, skills) (practical block). 5) Level of project utilization in educational activities and in life experiences (experiential block). For each criterion, self-assessment methods were used for a certain set of indicators, and the author's questionnaires and tests for each block of criteria were developed. Generalizations of the results showed such dynamics of indicators.

Within the research framework, a descriptive (two-level) and formative experiment was conducted to determine the extent to which the formation of project-based activity competence occurs during the study of various academic disciplines when using innovative technologies. The research aimed to identify the dynamics of developing this competence in the context of specialized training, specifically the educational course "Project Technologies" within the professional preparation of special education teachers at Kamianets-Podilskyi National University. The experiment involved 32 students from the second year and 38 students from the fourth year (first level of the descriptive experiment), as well as 71 master's students specializing in special education (distance learning) for the descriptive and control experiments. The descriptive experiment was conducted at the beginning and completion of the "Project Technologies" course.

Table 1

Indicators of readiness of students of different courses for project activities

Criteria	II course	IV course	V course (Masters) before the experiment	V course (Masters) after the experiment
innovative	12,8%	21,6%	23,8%	68,8%
motivational	18,1%	30,4%	35,1%	87,5%
cognitive	9%	18%	20%	70,1%
practical	29,6%	33,0%	36,1%	72,3%
experienced	18%	24,8%	25%	24,6%

Initially, diagnostic assessments were conducted based on the specified parameters among students from the second and fourth years. This provided us with an understanding of the extent to which the actual formation of project-based activity competence occurs within the structure of educational activities. We are talking about students who were engaged in traditional educational programs and project technologies studied superficially in the context of pedagogical, psychological disciplines and methods of teaching professional subjects, as well as through the use of these methods in organizing the educational process at the University. As the results of the ascertaining stage of the study showed, there were no significant changes in students of the second and fourth courses. In particular, the innovation criterion from the second to the fourth year increases by 8.8%, motivational – by 12.3%, cognitive – by 9%, practical – by

3.4%, and experimental – by 6.8%. In other words, there is a certain process of increasing quality indicators for these parameters, but they are insignificant.

A more detailed analysis of questionnaire responses, test performance, and research interviews revealed that, in general, students are aware of the relevance of project-based technologies in both educational and future professional activities. However, these knowledge levels are mostly fragmented, superficial, and lack a comprehensive understanding of the subject matter. This means that the ability to use project technologies in practical activities is minimal. It is characteristic that the highest indicators of readiness are obtained according to the criterion of readiness for project activities (personal characteristics, skills). Moreover, significantly higher indicators were observed in terms of personal readiness for project utilization, ranging from 29.6% to 33.0%. Specifically, students expressed their enjoyment in analyzing situations, modelling solution options, and forecasting effectiveness. They displayed an inclination towards creativity and perceived it as a factor for self-realization. They also expressed a preference for working in groups and forming team relationships. Students are young people who project prospects and program their competitiveness in the labour market. Graphically, the results of the ascertaining experiment are shown in the diagram (Fig. 1).

During the control experiment, it was found that the experimental groups exhibited a significant increase in the level of competence among the participants across almost all quality criteria. Specifically: Innovation criterion: The ability of fifth-year students to engage in project-based activities increased by 45%. Motivational criterion: 52.4% increase in motivation. Cognitive criterion: growth of 50.1%. Practical criterion: growth of 36.2%.

A graphical representation of the results of the control experiment is shown in the diagram (Fig. 2).

The significant improvement in the readiness indicators for project-based activities among future teachers after experimental training can be explained by the fact that the educational program was designed according to a step-by-step logic of developing theoretical and practical competencies based on the criteria embedded in the diagnostic program. In addition, during the training, students carry out their educational projects and theoretical material was structured in such a way as to provide theoretical and methodological support for this process.

Unexpectedly, the results showed minimal growth in the indicators for the experiential criterion, which represents the level of project utilization in educational activities and life.

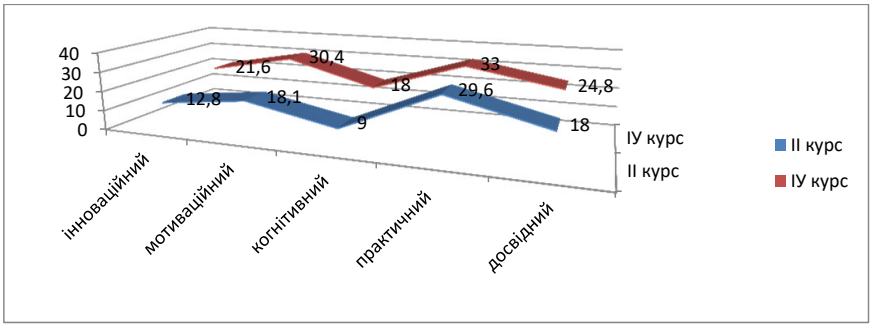

Fig. 1. The diagram depicting the dynamics of the development of project-based activity competence among future educators (second and fourth-year students) in the context of traditional education

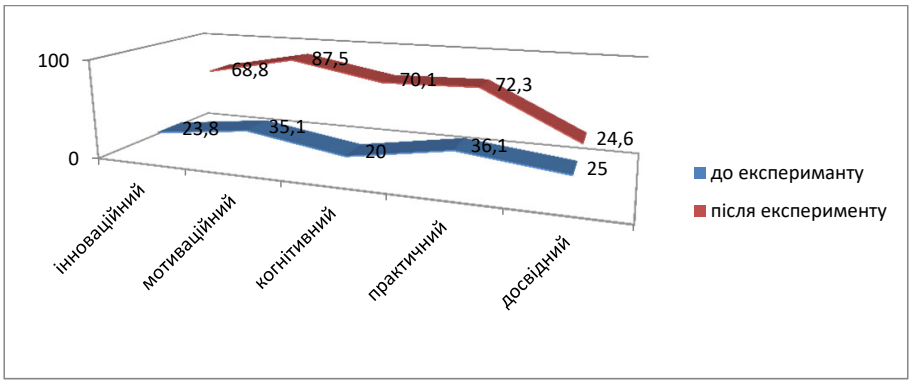

Fig. 2. Diagram of the dynamics of the development of future teachers' ability for project-based activities before and after experimental training

5. Results and Discussion of Experimental Findings

A more detailed analysis of the diagnostic textual materials revealed that the same group of students (25%) evaluated their ratings as inflated at the final stage of the experiment. This was because they had a rather vague understanding of projects and attributed programs and activities that are often referred to as "projects" in daily life but do not meet the criteria of project-based activities and their structural organization.

The conditions for achieving these objectives include an appropriate format for organizing the educational activities of future educators, which involves: a) The possibility of including special disciplines such as "Project Technologies" in the educational program (for example, as elective courses). b) Integration of the content module "Project Technologies" within the context of pedagogical disciplines. c) Utilizing project-based technologies in the process of studying other academic subjects. Even though we are talking about various opportunities for the formation of project competencies of future teachers, it is worth noting positions that will be common for all options, meet the above characteristics, which are naturally transformed into basic quality criteria. This can be demonstrated through the formulation of educational tasks within the framework of studying the subject of "Project Technologies." For example: Provide evidence that project technologies can be implemented within the competency-based education system. Interpret the possibilities of project activities as a means for students to explore their own identity, develop the ability to establish proper relationships with others, and achieve a socially significant position as active agents. Design a project aimed at applying knowledge and skills to solve real-life problems. Explain the significance of formulating the main problem and didactic goal within the execution of an educational project. What is the logic of working on a training project, and the stages of its organization? Describe the features of the first stage of Project organization, in particular the choice of the type and topic of the project, the formulation of the leading problem and the didactic goal. Demonstrate by example; what is the essence of forming working groups/teams for students' project activities? What are the conditions for ensuring their effectiveness?

Overall, the practice of experimental teaching has shown that the effective implementation of project technologies in the system of professional education for future educators should

be supported by appropriate content and methodological guidance. In particular, the main emphasis should relate to positions aimed at:

– enhancing the level of student agency, which determines their own trajectory of professional development, optimal for their potential and initial assets, as a mobile subject capable of lifelong professional self-improvement.

– ensuring a high level of integration of theory and practice, moreover, theory should be perceived as a real, effective, and most importantly – no alternative means of effectively solving practical problems;

– integrating personal and professional meanings (students analyze a situation/problem, comprehend its essence, and investigate it based on their own ideas and developed strategies of action): in this way, competencies are formed based on a "self-concept," and therefore the process of learning initiates the formation of a personally oriented concept, methodology, and style of future professional practice.

– dominance of research activities, which are especially relevant at the stages of complex analysis of the problem in the context of a certain situation; design and structuring of activities, conducting diagnostic measurements at the beginning and the end of the project;

– organizing teamwork with effective forms of collaboration and constructive communication, clear allocation of functions, and subject-to-subject relationships among project participants.

– pragmatic orientation of the project, awareness of its value for the development of professional competencies, ensuring future competitiveness in the labour market of all participants in the educational process;

– flexibility of the managerial component of project activity, the ability to modify it depending on the effectiveness of the process, mobility of positions of its participants, and the ability to change roles, and perform functions.

The conducted experimental training also demonstrates that project-based activities in the system of professional preparation of future educators contribute to the development of their stimulating and motivational basis through the pragmatic orientation of projects and the realization of their value in the context of becoming highly competitive professionals. It enables them to effectively solve professional problems in constantly changing situations.

6. Conclusions

The results of theoretical analysis and experimental training have shown that an innovative, person-centred education system, which includes project-based technologies, is not an end in itself. It should be perceived by all participants in the educational process as a fundamental condition for the development of professional competence and, consequently, the competitiveness of future specialists. It is important to understand that competence is not merely the acquisition of traditional knowledge and the ability to apply it in practice (classical approach), but rather an activity carried out according to one's concept, content, technology, and style. Competence is formed as a symbiosis of scientific knowledge (both theoretical and practical) and self-actualization of the individual within its context.

During the process of mastering project-based activity technologies, it is important to ensure a systematic understanding of their essence, basic characteristics, and goals that specify the type of educational activity and are realized through the use of project-based technologies. This is a prerequisite for developing a comprehensive understanding of the essence and

content-technological support of the project-based activity for future educators during their professional development stage.

Understanding the essence, goals, and anticipated outcomes of project-based activities, as well as their characteristics, allows for differentiation between genuine project-based activities and formal ones that merely exhibit superficial project features. The effectiveness of project-based activities is ensured through the flexibility of the management component, allowing for adjustments based on the progress of the process. It also relies on the mobility of participants' positions, and their ability to change roles and perform functions, ultimately contributing to productive teamwork.

In this context, it is important to recognize that an educational project is not simply a formal process of preconceived and designed actions. Rather, it is a means to establish a system for developing the professional competencies of a specialist. Within this system, a comprehensive approach is applied to address any relevant problem in a situation that is never repeated in the same way.

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