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APPLICATION OF DESIGN AND TECHNOLOGICAL ACTIVITIES AS A METHOD OF IMPROVING THE PROFESSIONALIZATION OF SPECIALISTS OF HIGHER EDUCATIONAL INSTITUTIONS

APLICAÇÃO DO DESIGN E ATIVIDADES TECNOLÓGICAS COMO MÉTODO DE APERFEIÇOAMENTO DA PROFISSIONALIZAÇÃO DE ESPECIALISTAS DE INSTITUIÇÕES DE ENSINO SUPERIOR

APLICACIÓN DEL DISEÑO Y ACTIVIDADES TECNOLÓGICAS COMO MÉTODO DE MEJORA DE LA PROFESIONALIZACIÓN DE ESPECIALISTAS DE INSTITUCIONES DE EDUCACIÓN SUPERIOR

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Abstract: In this article we developed the concept of design and technological activities. We tested the need to develop design competence in educational process of the Faculty of Law of the National Economic University with 50 teachers and 200 students of the Faculty comprising Law, International Law, Law Enforcement, Social Work, and Psychology. Design competence is knowledge for preparation of pedagogical projects and their implementation, developed in the educational process. The current stage is characterized by globalization of problems requiring involvement of the world community, changes the paradigm of education, posing new challenges to the educational sphere. Accelerating pace of socio-economic development requires to plan and evaluate life and professional prospects. It becomes important for teachers to learn how to design pedagogical reality, predict the consequences of its transformations and teach students to build their lives on the basis of design. These trends urge the problem of design, make it interdisciplinary, exceptionally large-scale and pressing. Promising areas for development of design and technological activities include: identification of new patterns and principles of pedagogical design; identification of new factors and conditions for successful operation and development of design activities; development of theoretical background for training, retraining and advanced training of personnel in the field of pedagogical design; detailed development of methodological and technological support of the pedagogical design process; improvement of the qualimetric tools of design activity. Verification of the concept against the background of the identified set of pedagogical conditions showed an increase in the efficiency of design and technological activities.

Keywords: Design and technological activity, Pedagogical design, Pedagogical programming concept, Training students of a higher education institution; Competence development model; Professional education.

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Resumen: Neste artigo desenvolvemos o conceito de design e atividades tecnológicas. Testamos a necessidade de desenvolver competências de design no processo educacional da Faculdade de Direito da Universidade Econômica Nacional com 50 professores e 200 alunos da Faculdade compreendendo Direito, Direito Internacional, Aplicação da Lei, Serviço Social e Psicologia. A competência de design é o conhecimento para a elaboração de projetos pedagógicos e sua implementação, desenvolvido no processo educacional. O estágio atual é caracterizado pela globalização de problemas que exigem envolvimento da comunidade mundial, muda o paradigma da educação, trazendo novos desafios para a esfera educacional. A aceleração do ritmo de desenvolvimento socioeconômico exige um planejamento e uma avaliação das perspectivas de vida e profissionais. Torna-se importante para o professor aprender a projetar a realidade pedagógica, prever as consequências de suas transformações e ensinar os alunos a construir suas vidas com base no design. Essas tendências estimulam o problema do design, tornam-no interdisciplinar, excepcionalmente grande e urgente. Áreas promissoras para o desenvolvimento do design e das atividades tecnológicas incluem: identificação de novos padrões e princípios de design pedagógico; identificação de novos fatores e condições para a operação e desenvolvimento bem-sucedidos das atividades de design; desenvolvimento de base teórica para a formação, reciclagem e formação avançada de pessoal na área do desenho pedagógico; desenvolvimento detalhado do suporte metodológico e tecnológico do processo de projeto pedagógico; melhoria das ferramentas qualimétricas da atividade de design. A verificação do conceito no contexto do conjunto de condições pedagógicas identificado mostrou um aumento na eficiência do design e das atividades tecnológicas.

Palabras clave: Design and technological activity, Pedagogical design, Pedagogical programming concept, Training students of a higher education institution; Competence development model; Professional education.

Resumo: En este artículo desarrollamos el concepto de diseño y actividades tecnológicas. Probamos la necesidad de desarrollar la competencia de diseño en el proceso educativo de la Facultad de Derecho de la Universidad Nacional Económica con 50 profesores y 200 estudiantes de la Facultad que comprende Derecho, Derecho Internacional, Aplicación de la Ley, Trabajo Social y Psicología. La competencia de diseño es el conocimiento para la elaboración de proyectos pedagógicos y su implementación, desarrollado en el proceso educativo. La etapa actual se caracteriza por la globalización de problemas que requieren la participación de la comunidad mundial, cambia el paradigma de la educación, planteando nuevos desafíos al ámbito educativo. El ritmo acelerado del desarrollo socioeconómico requiere planificar y evaluar las perspectivas de vida y profesionales. Es importante que los docentes aprendan a diseñar la realidad pedagógica, pronostiquen las consecuencias de sus transformaciones y enseñen a los estudiantes a construir sus vidas sobre la base del diseño. Estas tendencias impulsan el problema del diseño, lo hacen interdisciplinario, excepcionalmente a gran escala y urgente. Las áreas prometedoras para el desarrollo del diseño y las actividades tecnológicas incluyen: identificación de nuevos patrones y principios de diseño pedagógico; identificación de nuevos factores y condiciones para la operación exitosa y el desarrollo de actividades de diseño; desarrollo de antecedentes teóricos para la formación, reciclaje y formación avanzada de personal en el campo del diseño pedagógico; desarrollo detallado del soporte metodológico y tecnológico del proceso de diseño pedagógico; mejora de las herramientas cualimétricas de la actividad de diseño. La verificación del concepto en el contexto del conjunto identificado de condiciones pedagógicas mostró un aumento en la eficiencia del diseño y las actividades tecnológicas.

Palavras-chave: Diseño y actividad tecnológica, Diseño pedagógico, Concepto de programación pedagógica, Formación de estudiantes de una institución de educación superior; Modelo de desarrollo de competencias; Educación profesional.

1 INTRODUCTION

culture in all its basic elements related to human creativity. Design and technological activity as a special form of creativity is a unique means of professional and personal growth of a person, a method of permanent improvement of oneself and one's environment. Involving university students in creativity is one of the most important ways to develop their skills and professionalism. In this context, the authors of [Quinn, Anderson, &

Finkelstein, 1996] determine the creative competence of students, which is developed both through theoretical learning and in various forms of extracurricular creative activities, emphasizing that the formation of a creative harmonious personality is not immediate but gradual, and each stage requires special knowledge, experience and skills, which form the desire of young people to study, think, and create.

Pedagogical design finds its application, first of all, in innovative spheres, were stereotypical thinking based on the experience of the past is not enough. This is a special area of educational activity, which includes solving analytical problems of increased complexity related to the identification of the whole set of pedagogical factors and conditions that contribute to or hinder the implementation of scientific recommendations in the real pedagogical process [Liou, & Hung, 2015]. Thus, we need to clearly understand the essence of pedagogical design, the ability to implement it taking into account specific patterns and principles.

Literature Review

The scholars have conducted active research aimed at building a design theory since the 1920's. The works of [Baird, Schneier, & Laird, 1983] on the nature, features and effectiveness of traditional design made a significant contribution to its development; research conducted by [Gessler, 1988] deals with the connection of design with the creative potential and ingenuity of the designer; works by [Yorulmaz, Altinkurt, & Yilmaz, 2015] on the value aspect of forecasting in social design; publications by [Forkosh Baruch, & Meishar Tal, 2019] cover the issue of goal setting in the process of pedagogical design and certain aspects of its optimization.

The research of [Bonwell, & Eison, 1991] covers the problems of designing the educational process in general, the works of [Deng, & Tavares, 2013] deal with methodological systems, [Zhou 2020] studied personality-developing pedagogical tools.

The works of [Dupuy, et al.2011] study particular pedagogical technologies, the work of [Kramer, et al. 2020] cover international education systems. In pedagogy, the researcher also refer to design as a very specific way to solve complex pedagogical problems. In the technical field, design is traditionally interpreted as a preparatory stage of production activities [Moriña, & Orozco, 2020].

Despite the long history of practical use, neither foreign nor domestic scientific literature provides generally accepted interpretation of the term "design". According to [Moriña, & Orozco, 2020], it is a purposeful activity aimed at solving the problem; [Moriña, & Orozco, 2020] defines it as a decision-making with insufficient awareness and high responsibility for the mistake; [Antikainen, 2006] - as the choice of some mode of action, an iterative process in which many times a decision is made on the development of a project and an object of design is repeatedly modelled; [Hannula, 2007] — a continuous process in which scientific and technical information is used to create a new system or process that brings some benefit to society.

The analysis of scientific works on the problem of traditional design allowed us to make the following generalizations. First, any pedagogical project involves an innovative approach, when a new object is created on the basis of a particular invention. Besides, only an object that does not yet exist or has not been used under these conditions is designed. Duplication of an already created invention is not a design [Sternberg, 2006]. Second, the design process does not end with the creation of a drawing or layout of the object — the project must still be adapted to mass production (replication), which is provided by possible design changes. In this case, as [Sternberg, 2006] noted that engineering is always preceded by design. Third, the project always has a tangible medium and a detailed description. If we are talking about design, there must be a result — a project with a documentary and information support [Schuelka, 2013].

This study intends to develop and verify the concept of pedagogical design, which ensures the effective creation and implementation of pedagogical projects.

2 METHODS AND MATERIALS

Since the article focuses on the determination of design and technological activities, we studied and systematized pedagogical experience for the formation of pedagogical tools for design and technological activities of university students. with the help of content analysis. It also focuses on determination of the content of specialized subjects and pedagogical modelling which is carried out for the purpose of studying laws of professional training, research of pedagogical conditions and identification of a technique of design actions.

Questionnaires, counselling, testing were important for the study to identify the level of design skills of teachers and students. We also used statistical and mathematical methods of calculating results. However, pedagogical modelling and pedagogical experiment play a special role in forming the methodological background of the conducted research.

Pedagogical modelling is a reflection of the characteristics of the existing pedagogical system in a specially created environment, which is called the pedagogical model [Torrance, 1988]. The model is a system with the features of the original, but is different from it in terms of certain parameters. For the purposes of this study, it replaces the original and allows gaining new knowledge about it. As a component of design and technological activities, modelling is characterized by the following provisions: 1) the purpose is to obtain a model of the designed system, which has all its features, novelty, is able to solve pedagogical problems, prepared for mass use and has full information and documentary support; 2) the object is an innovative system, which, upon construction and implementation in the educational process, contributes to the solution of an urgent pedagogical problem; 3) the subject — a teacher-designer who has a sufficient level of professional and pedagogical competence; 4) the method — creative modelling; 5) stages — problem statement, model creation, its research, knowledge transfer; 6) the result — a new model of the pedagogical system [Smit, et al. 2020].

Pedagogical experiment as a set of methods of pedagogical research, designed for objective and evidential verification of the hypothesis, is a basic component of design and technological activities, and provides an assessment of the effectiveness of the result of pedagogical design [Knoll, 1993). 300 Jahre lernen am Projekt. Zur Revision unseres Geschichtsbildes. *Pädagogik*, *45*(7-8), 58-63.]. On the whole, it is based on the general methodological principles of organization and conduct of the experiment, having, of course, its own features. These include: a) the provisions under review require a full-scale preliminary theoretical justification, as their implementation may have irreversible consequences; b) the researcher has to take into account different factors that affect the studied pedagogical object; c) pedagogical experiment, as a rule, is carried out in the natural conditions of the educational process, and is regulated by the existing regulatory framework; d) the organization and choice of means of experiment is determined not so much by objective as by subjective factors; e) any of its results have scientific value. The pedagogical experiment should be conducted optimally, i.e. with the minimum necessary time, effort and money of the experimenter [Fried-Booth, 2002].

Figure 1 Determines the stages of the pedagogical experiment.

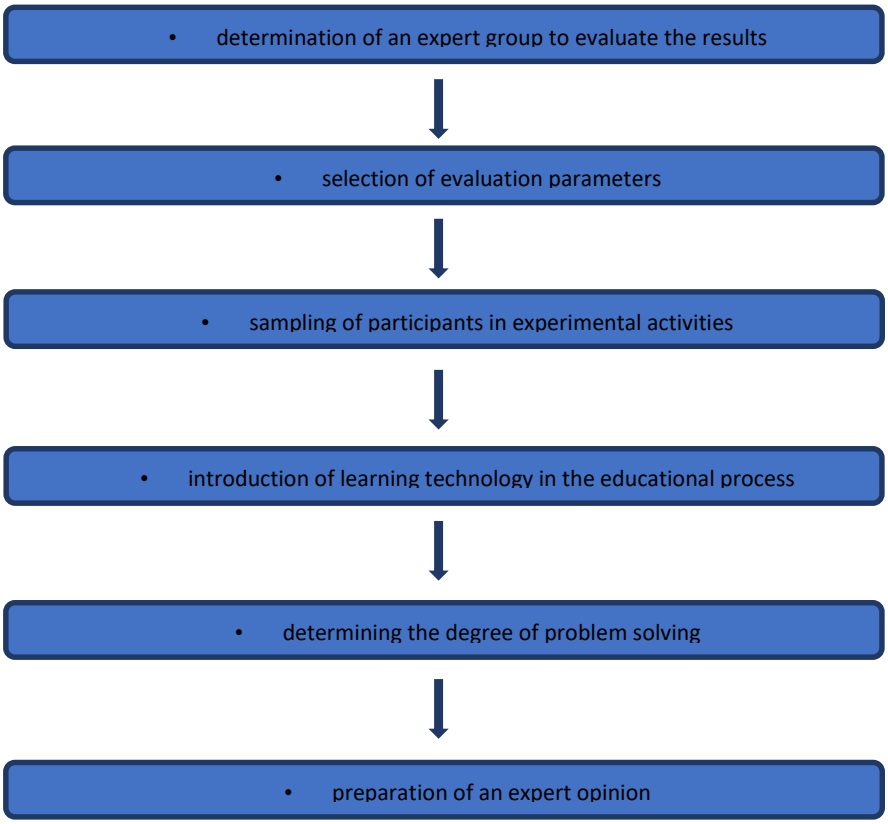


Figure 1. Stages of the pedagogical experiment

The line of research is due to the need to substantiate the following hypothesis. Design and technological activities will be more effective if:

- First, they are implemented it in accordance with the pedagogical concept, where its core is a set of patterns and principles of pedagogical design, including:

a) attributive regularity and related principles of systemacy, the use of currently available technologies, feedback;

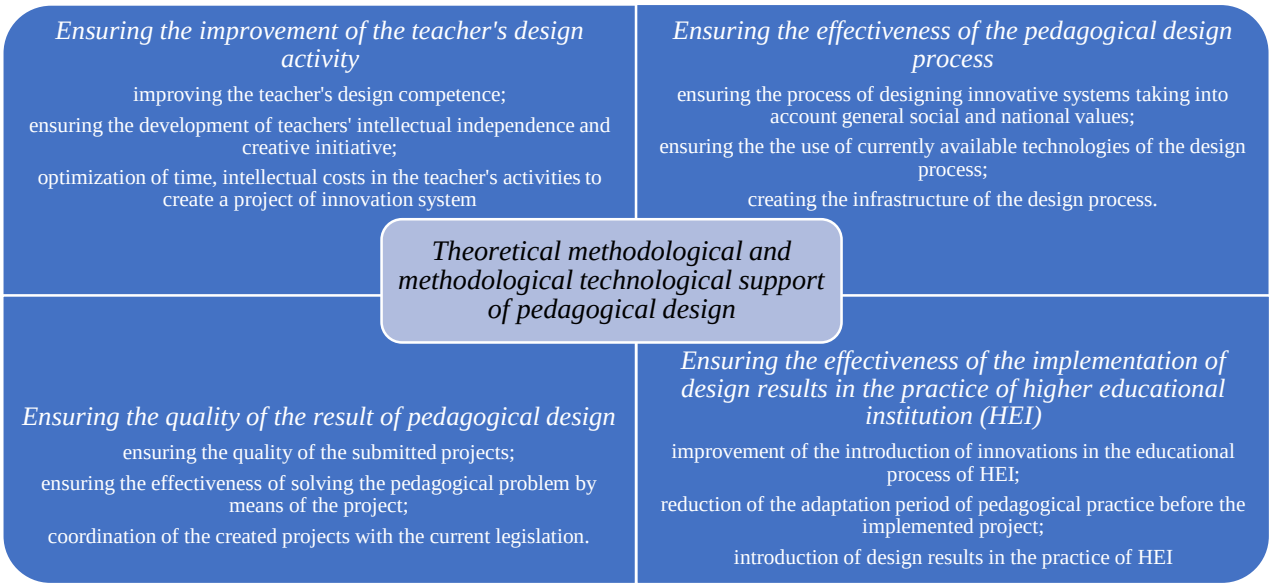
b) regularity of conditionality and principles of perspective development of value orientations, sufficiency of resources;

c) regularity of efficiency and principles of timeliness and truthfulness of information, purposefulness;

d) principles of scientific nature, accessibility, flexibility, optimality of content and meaning, a component composition of pedagogical design of innovative systems are common to the identified patterns (pedagogical invention, modelling and experiment), which is implemented through stages of design activities (creation of pedagogical invention, creation of a single prototype, organization and implementation of pedagogical experiment, creation of the final project);

- Second, they are implemented against the background of a set of pedagogical conditions, which includes the creation of an external information and pedagogical environment of design, the formation of teacher's design competence, monitoring of design activities (Figure 2).

Figure 2. Elements of the system of theoretical methodological and methodological technological support of pedagogical design



Research Design

The study was conducted at the Faculty of Law involving a total of 50 teachers and 200 students majoring in 081 Law, 293 International Law, 262 Law Enforcement, 231 Social Work, and 053 Psychology.

At the first stage we established the socio-historical background for the formation of design and technological activities, conducted the research of rational theoretical and methodological approaches, studied the state of the problem of design and technological activities in scientific literature and pedagogical practice, identified key research positions, its conceptual framework, and experimentally tested separate procedures of pedagogical design.

We also carried out theoretical methodological and methodological technological development of the concept of pedagogical design, grounded the key provisions, carried out their testing and experimental evaluation in the design of educational technologies of different types.

At the next stage, we determined the possibilities of verification of the constructed concept, developed the criteria of quality of process and result of pedagogical design, identified pedagogical conditions of efficiency of design activity, and carried out their testing in the educational process of university.

The final stage included the final processing of the results, drawing conclusions, implementation of the main provisions of the study in the practice of the university.

Description of the Pedagogical Experiment

To substantiate the hypothesis of the effectiveness of design and technological activities, we conducted two pedagogical experiments with the participation of students and teachers of the Faculty of Law: the first — to assess the effectiveness of design and technological activities, the second — to assess the impact of design competence on the effectiveness of teacher-designer. As part of our first experimental work to assess the effectiveness of design and technological activities, we specially created an external information environment for each project, which included: a) regulations of different levels (laws, statutes, instructions, decisions of pedagogical and educational councils); b) systematization of scientific works of researchers who studied this issue (lawyers, psychologists, physicians, social educators); c) educational literature and reference material needed to work on the project. The participants of the experiment used the provided information, forming their own information and pedagogical environment for working on the project. As a result, they created an

information card index, which stored productive innovative ideas, the results of generalization of effective experience, the most important quotes from legal and scientific-pedagogical sources, information about the effectiveness of projects. We supplemented and updated the information bank formed in this way when creating the next pedagogical project. Experience has shown that the use of a data bank in the design activities greatly optimizes the work of a particular teacher, allows it to be organized on a scientific basis, increases the level of competence.

We formed two groups to conduct the experiment. The object of research in the experimental group were projects created by students majoring in 081 Law, 293 International Law (7 projects) and current faculty members (8 projects). Students carried out project activities as part of their internship and study of the Administrative Law and Procedure course. In particular, 2 projects for the development of the legal clinic, 3 projects for a model court hearing, 2 projects for pre-trial dispute resolution.

Teachers prepared projects within the research work of the educational institution to improve innovation activities (5 projects of classes, 2 projects of the Oxford debate on the subject, and 1 project of organizing independent work on the academic topic).

The control group included projects received without the creation of an external information and pedagogical environment by students majoring in 293 International Law during internship and preparation of term papers (7 projects, including 4 projects — model court hearing, 1 — legal clinic development, and 2 — legal online consulting), as well as teachers (9 projects, of which 6 — development of innovative teaching methods; 3 — activities for independent work of students).

We tested the following hypothesis: projects performed in the experimental group do not exceed the quality of projects created in the control group. The quality of each project was evaluated by a group of experts according to the methodology described in Table 1. The expert group consisted of heads of departments and Deputy Dean of the Faculty of Law for educational and methodological work.

Table 1. Criteria for expert evaluation of the pedagogical project

Evaluation aspect	Examination criteria	
	Actual	Prognostic
Socio-pedagogical	Topicality of the pedagogical problem solved; the need for pedagogical projects; large-scale involvement; compliance with regulations in the field of education	The impact of the project on the educational situation in the regional education system; prospects of influence on the organization and working conditions of teachers, administrative staff, and the institution as a whole; the impact of the project on the formation of socially significant value orientations of students
Psychological and pedagogical	Soundness in accordance with the age and individual peculiarities of students; compliance with psychological and pedagogical laws; demand for proposed projects; psychological comfort of project implementation (lack of overloads, possibility of communication with the teacher, mutual assistance and cooperation between students, etc.;)	The impact of the project on the psychological state of students and teachers, teaching and student teams; compliance of psychological qualities that are formed as a result of using the project with the requirements of the future profession of a student; potential opportunities for psychological self-improvement of students
Valeological	Degree of compliance with hygiene standards in education;	The impact of the project on the health of students and teachers;

	compliance of the complexity of the project with the features and capabilities of teachers and students	potential opportunities for maintaining the health and well-being of project participants; the impact of the project on the environment
Scientific and methodical	Soundness and significance; completeness of documents submitted; compliance with the main directions of scientific work of the educational institution and its methodological system; compliance with the scientific achievements of modern pedagogy; soundness of methodological support; readiness of the author and participants to implement the project	The impact of the project on the development of the methodological system of the educational institution; the impact of the project on the full use and development of the scientific potential of the educational institution; the potential of the scientific tools inherent in the project to solve existing problems
Administrative	The degree of involvement of structural units of the management system of the educational institution; completeness of information support; sufficiency of organizational and executive component; adequacy of the control and diagnostic component; adequacy of the correctional staff	The impact of the project on the state of the management system of the educational institution; prospects for the development of the educational institution as a whole
Material and technical	Project cost; compliance of the material and technical resources of the educational institution; financial costs and time required for project implementation	Prospects for the impact of the project on the economy of the educational institution; opportunities to improve the material and technical resources of the educational institution

We carried out the second experiment to assess the impact of design competence on the effectiveness of the teacher-designer with the involvement of students majoring in 262 Law Enforcement and 053 Psychology. We involved a total of 22 full-time students, who created individual projects of different types. As a result, we received 5 projects of model court hearings, 5 projects of court debates, 6 projects on consulting business entities, 4 projects of amendments to the current legislation, 2 projects on preparation of procedural documents.

The experts evaluated each project in accordance with the following criteria: relevance; compliance with the provisions of current legislation; efficiency of problem solving; time spent on project creation; independence of execution; correctness of drawing up; originality; flexibility; novelty; realism; possibility of large-scale use; theoretical soundness; practical significance; quality of project presentation and defence.

The experts evaluated student projects using the above criteria on a special scale: 2 points — “unsatisfactory”, 3 points — “satisfactory”, 4 points — “good”, 5 points — “excellent”. Summarizing the points for each indicator, we get a project score in the range of 30 to 75 points. In this case, the quality of the project is considered low (level I), if it received no more than 44 points, medium (level II) — 45 to 59 points, high (level III) — not less than 60 points according to the results of the examination.

The experts evaluated the design competence of students on the same scale:

knowledge of: 1) the main provisions of the theory of administrative law; 2) the main provisions of modelling theory; 3) the main provisions of the theory of the experiment; 4) principles and patterns of design activities;

ability to: 1) use methods of solving practical problems; 2) carry out legal modelling; 3) conduct a pedagogical experiment; 4) select, evaluate and use information; 5) summarize and draw conclusions; 6) draw up documentation for the project; 7) act independently using personal experience.

The experts determined the level of student competence by the sum of the received points: low (Level A) —26 to 38 points, average (Level B) — 39 to 51 points, high (Level C) —52 to 65 points.

When choosing indicators for assessing students' design competence, we took into account the following aspects. First, the rather limited period of experimental preparation of students for design activities does not allow us to assess some certainly important indicators through the methods existing in pedagogy. This applies, first of all, to individual's qualities, as well as some indicators of personal and individual competence. Second, only knowledge of special and social competence, as well as some design skills can be adequately assessed by traditional pedagogical methods (surveys, interviews, questionnaires, testing, etc.). Third, since we are talking about educational projects, and the real pedagogical process does not provide for their implementation, the indicators of extreme effectiveness are not subject to evaluation.

3 RESULTS

So, we will demonstrate the data obtained as a result of the first experiment in Figure 3, combining the projects of each group according to quality levels.

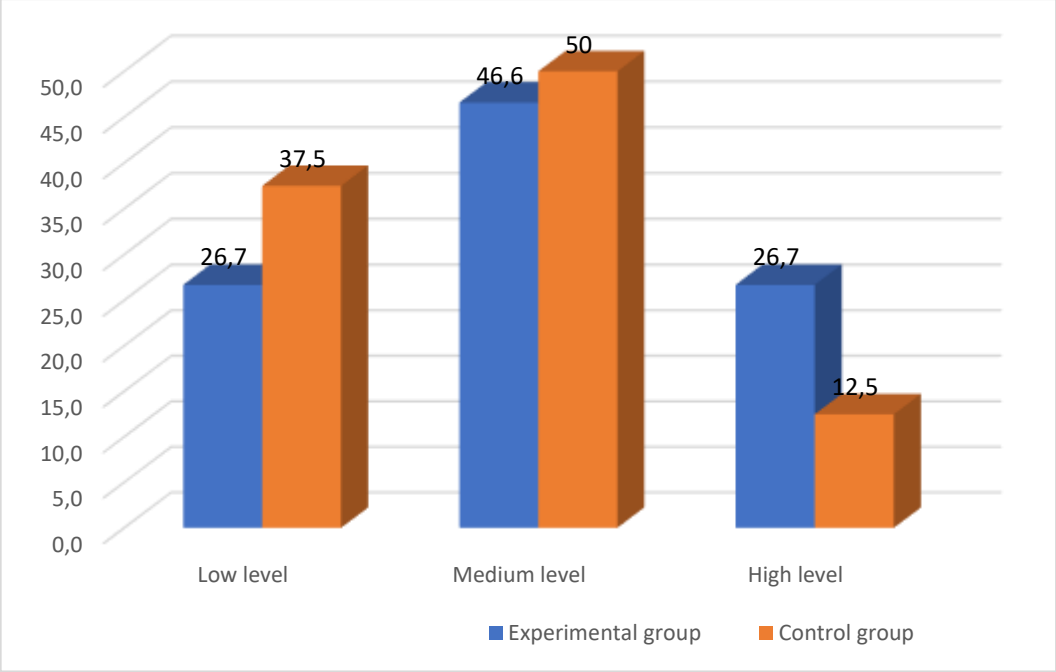


Figure 3. Combining the projects of experimental and control group according to quality levels

According to the results of the study, the number of projects implemented at a high level in the experimental group is more than twice as high as in the control group. At the same time, the number of low-level projects is lower by 10.8%.

Thus, the creation and development of an external information environment of design is an essential condition for improving the efficiency of its implementation, as it affects not only the procedural aspect, but also largely determines the content, type and effectiveness of the project. Table 2 presents the data obtained in the second pedagogical experiment.

Table 2. The relationship between design competence and the quality of the pedagogical project

Project competence		Pedagogical projectquality
Competence level	Number of teachers	
a	7	I - II
b	7	II - III
c	8	III

The result of the conducted pedagogical experiment indicates that Levels I and II of project quality correspond to the Level A of project competence, Levels II and III of project quality — to Level B, mainly Level III of project quality — to Level C. Thus, we can draw the following conclusion: there is a stochastic relationship between the assessment of the quality of the pedagogical project and the design competence of its developer, which are based on the basic provisions of our concept. The development of design competence not only determines the content of the design process, but also directly affects its effectiveness in terms of resource provision, achieving goals and obtaining the desired quality result.

4 DISCUSSION

The topicality of the study of design and technological activities is currently due to the need for each teacher to constantly solve problems related to professional creativity, creation and implementation of innovations of different types and levels. At the same time, according to our data, most university teachers (about 75% of 200 respondents) consider their design competence in sufficient realizing the importance of special training for this type of activity. The majority of respondents (about 90%) have experience in creating innovations, which 40% of them consider unsuccessful. The reasons for failures primarily include poor training, ill-considered innovative solutions, insufficient consideration of the conditions of functioning of the new object. Among educators who have effective experience in creating and implementing innovations, only one in five was able to name the sequence of his design actions and describe the pedagogical project. The rest recognized their actions to create the project as spontaneous or unconscious. Thus, the analysis of existing pedagogical practice showed, on the one hand, the need for special preparation for design activities to solve pressing problems at the level of a particular teacher, methodological association, educational institution, etc. On the other hand, its obvious lack in theoretical and practical terms, which is expressed in a lack of understanding of the essence of pedagogical design and its result, poor knowledge of design procedures, ignoring the properties, principles and patterns of design process, which ultimately leads to uncontrollability of the created innovation system and unexpected (not always positive) results.

Based on the results of pedagogical experiments in psychological, pedagogical and special literature on the problem of design in general and pedagogical design in particular, as well as given the experience of building different pedagogical projects, we developed a model of design and technological activities of higher educational institution (Figure 4).

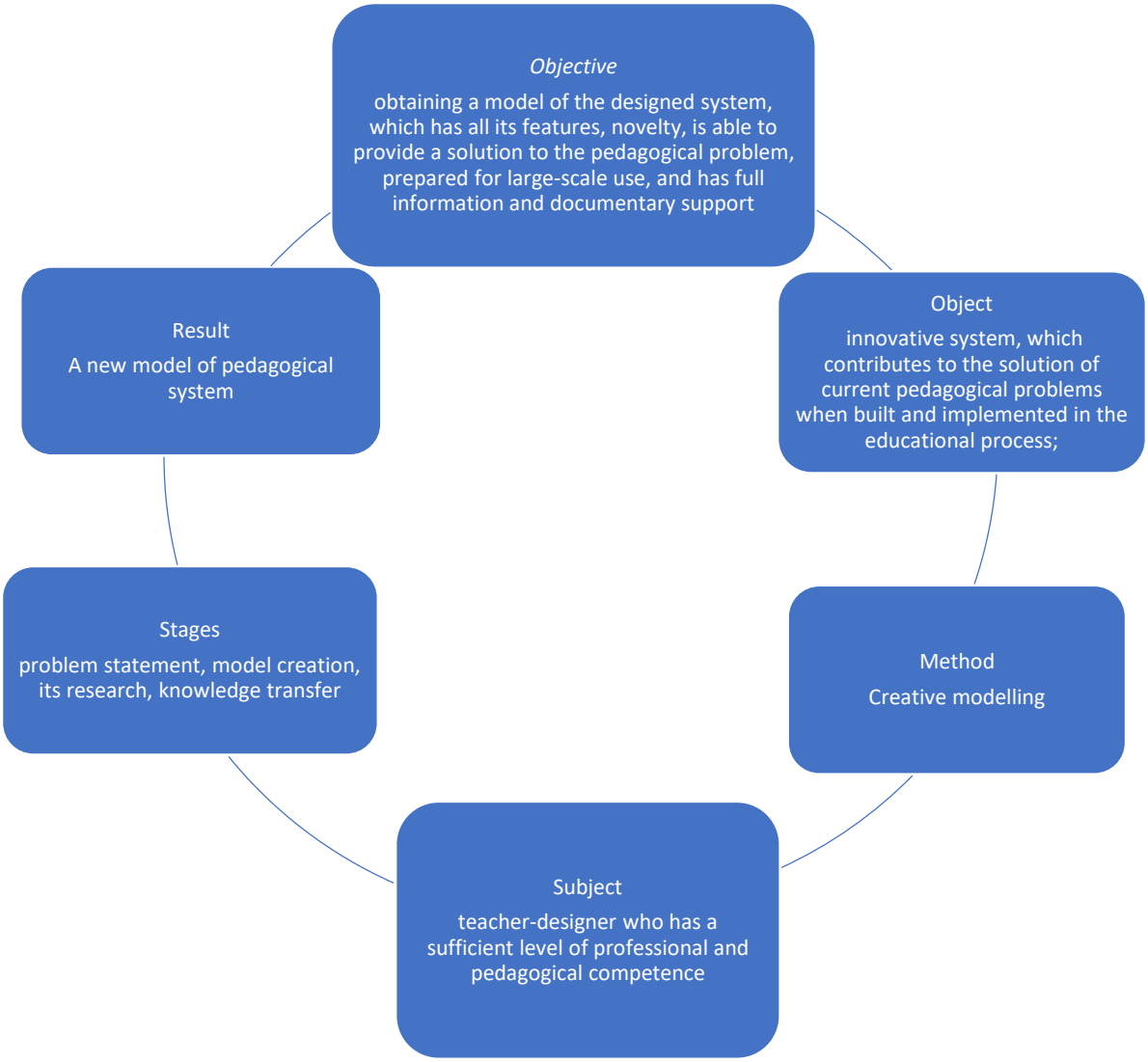


Figure 4. Model of design and technological activities of higher educational institution

Expert evaluation of the quality of pedagogical projects requires the identification of a special set of its indicators. The study of this problem revealed that there is no universal set that allows us to fully determine the quality of design and technological activities. It is clear that an unlimited number of indicators will not allow us to assess all the characteristics of the project with such limitations. This means that we will always get some approximate level of its quality. Therefore, we should not strive for an "absolute" quality indicator: it is enough to determine the place of a particular project among the projects designed for the same purpose. To do this, a certain set of criteria must be created in each particular case to serve the basis for the comparison. At the same time, all project quality indicators can be combined into generalized criteria according to certain aspects of evaluation.

We agree with [24] that the pedagogical project should be evaluated taking into account the socio-pedagogical, psychological and pedagogical, valeological, scientific and methodological, managerial, financial and economic, as well as material and technical aspects.

5 CONCLUSIONS

The performed theoretical and experimental work allowed making the following generalized conclusions.

In modern conditions of modernization of the educational system, the problem of building an integrated theory of design and technological activities is one of the most pressing ones, which ensures the effectiveness of design activities in the creation and implementation of innovative systems in educational practice.

Based on the requirements of systemacy, completeness, consistency and reliability, the developed concept of pedagogical design of innovative systems in structural terms includes general provisions, conceptual framework, core and content.

Comprehensive research of design and technological activities, as well as the construction of its integrated theory is the most effective on the basis of the dialectical unity of system, activity and information approaches. The activity approach as a theoretical and methodological strategy defines design as a pedagogical activity and reveals its key features that ensure the achievement of the goal. The information approach as a practice-oriented tactic allows describing the content and result of pedagogical design as a process, activity and system.

Regularities and principles that underlie the teacher's design activities to create innovative systems determine its practical content, line and effectiveness, allow avoiding excessive rigidity and details of projects.

Design and technological activities of the teacher include three main components, each having its own functional purpose and contributing to the common goal: pedagogical invention provides novelty of the project, modelling ensures creating a pedagogical structure of the required type, experiment allows verifying its effectiveness. Implementation of pedagogical design of innovative systems as a process is carried out through the stages of creating a pedagogical invention, creating a single prototype, organizing and implementing a pedagogical experiment and creating a final project.

Pedagogical conditions for the effectiveness of design activities include the creation of an external information environment for the design of innovative systems, the development of teacher's design competence and monitoring of design activities. This complex takes into account the main provisions of the concept and provides its experimental verification.

Design and technological activities are productive in accordance with the provisions of the concept, which is tested experimentally in the natural conditions of the real educational process. This study does not exhaust the problem of pedagogical design.

Promising areas of further study of this problem include identification of new patterns and principles of pedagogical design; identification of new factors and conditions for the successful functioning and development of teachers' design activities; development of theoretical background of training, retraining and advanced training of personnel in the field of pedagogical design of innovative systems; detailed development of methodological and technological support of the pedagogical design process; improvement of the qualimetric tools of design activity.

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