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## PEDAGOGICAL CONDITIONS FOR THE FORMATION OF STUDENTS' INNOVATIVE THINKING

### *Abstract*

The article substantiates the relevance of the presented topic, draws attention to the problem of formation and development of innovative thinking among university students. In conditions of constant changes, rapid development of technologies and the surrounding reality, graduates need appropriate competencies, among which innovative thinking stands out, allowing them to change professional reality based on the knowledge and skills acquired at the university in order to improve its quality. The authors reveal the essence of the concept of "innovative thinking", the differences between creative and innovative thinking. The purpose of the study is to determine the pedagogical conditions for the formation and development of innovative thinking among university students. To achieve this goal, methods of theoretical analysis and processing of empirical data were used. The main method was a survey of students using a questionnaire developed by the authors. The analysis made it possible to identify the pedagogical conditions for the formation of innovative thinking: self-realization, the introduction of innovative educational technologies, consideration of individuality, the creation of an innovative environment and the role of a teacher coordinator.

**Keywords:** innovation; innovator, innovative thinking, competencies, students, university.

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## СТУДЕНТТЕРДІҢ ИННОВАЦИЯЛЫҚ ОЙЛАУЫН ҚАЛЫПТАСТЫРУДЫҢ ПЕДАГОГИКАЛЫҚ ШАРТТАРЫ

### *Аңдатпа*

Мақалада ұсынылған тақырыптың өзектілігі негізделеді, жоғары оқу орындарының студенттерінде инновациялық ойлауды қалыптастыру және дамыту мәселесіне назар аударылады. Тұрақты өзгерістер, технологиялардың қарқынды дамуы, қоршаған шындық жағдайында түлектерге тиісті құзыреттер қажет, олардың ішінде университетте алған білім мен дағдылар негізінде оның сапасын арттыру мақсатында кәсіби шындықты өзгертуге мүмкіндік беретін инновациялық ойлау ерекшеленеді. Авторлар "инновациялық ойлау" ұғымының мәнін, шығармашылық және инновациялық ойлау арасындағы айырмашылықтарды ашады. Зерттеудің мақсаты-ЖОО студенттерінде инновациялық ойлауды қалыптастыру мен дамытудың педагогикалық шарттарын анықтау. Осы мақсатқа жету үшін деректерді теориялық талдау және эмпирикалық өңдеу әдістері қолданылды. Негізгі әдіс

ретінде авторлар жасаған сауалнаманы қолдана отырып, студенттерге сауалнама жүргізілді. Жүргізілген талдау инновациялық ойлауды қалыптастырудың педагогикалық шарттарын бөліп көрсетуге мүмкіндік берді: өзін-өзі жүзеге асыру, инновациялық білім беру технологияларын іске асыру, даралықты есепке алу, инновациялық органы құру және оқытушы-үйлестірушінің рөлі.

**Түйін сөздер:** инновация, инноватор, инновациялық ойлау, құзыреттілік, студенттер, ЖОО.

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## ПЕДАГОГИЧЕСКИЕ УСЛОВИЯ ФОРМИРОВАНИЯ ИННОВАЦИОННОГО МЫШЛЕНИЯ СТУДЕНТОВ

### *Аннотация*

В статье обосновывается актуальность представленной темы, обращается внимание на проблему формирования и развития инновационного мышления у студентов вузов. В условиях постоянных изменений, стремительного развития технологий, окружающей действительности выпускникам необходимы соответствующие компетенции, среди которых выделяется инновационное мышление, позволяющее на основе полученных в вузе знаний и навыков изменять профессиональную реальность в целях повышения ее качества. Авторы раскрывают суть понятия «инновационное мышление», различия между творческим и инновационным мышлением. Цель исследования – определить педагогические условия формирования и развития инновационного мышления у студентов вузов. Для достижения данной цели использовались методы теоретического анализа и эмпирической обработки данных. В качестве основного метода выступил опрос студентов с использованием разработанной авторами анкеты. Проведенный анализ позволил выделить педагогические условия формирования инновационного мышления: самореализация, реализация инновационных образовательных технологий, учет индивидуальности, создание инновационной среды и роль преподавателя-координатора.

**Ключевые слова:** инновации, инноватор, инновационное мышление, компетенции, студенты, вуз.

**Main provisions.** The determinization of the pedagogical conditions for the formation and development of innovative thinking among university students is one of the goals of study.

Innovative thinking is a complex process involving many components. Innovative thinking is the quality of an innovator.

Skills as competencies that need to be formed in students for the development of innovative thinking in the learning environment

**Introduction.** The urgency of the problem of the development of innovative thinking is due to the modernization of the education system, the labor market. Any state should be interested in more subjects with innovative thinking, because their presence largely ensures the dynamism and development of society [1, p. 125].

Globalization and the development of the world labor market exacerbates the need for university graduates who possess a new format of competencies. The education system has gone from a knowledge-based approach to a competence-based approach, which is aimed at developing various types of competencies.

Competencies are defined as "the ability to use the knowledge, skills and abilities acquired in the learning process in professional activity" [2].

In the conditions of constant changes, rapid development of technologies, and the surrounding reality, graduates need appropriate competencies, among which innovative thinking stands out, allowing them to change professional reality based on the knowledge and skills acquired at the university in order to improve its quality.

Thus, the success of students' future professional activity largely depends on their innovative thinking. Despite the demand for innovative thinking, not all university graduates have it. E.L. Buslaeva notes that "the educational environment is closely connected with the system of social values and contains specially organized conditions and opportunities for the development and formation of personality. It is in the university that the qualities necessary for professional activity and the implementation of socially significant goals and objectives are laid. Consequently, the educational environment should create the conditions necessary for the development and formation of an active, innovative-minded personality" [3, p. 350]. Let's consider the connection of key concepts in the framework of our study.

The concept of "innovation" is generally understood as the introduction of something new, a new formation. Linking the concepts of "innovation" and "innovative thinking", it can be assumed that the latter implies a certain style of thinking of a person that allows him to create innovations that lead him to innovation. The number of interpretations of the concept of "innovative thinking" has grown significantly in recent years.

In the work of V.P. Delia, innovative thinking in the most general form should be understood as "developing thinking leading to new results, the subject of which is "processes aimed at creating new fragments of reality, their transformation or, conversely, maintaining a stable state of existing reality" [4, p. 32].

A.P. Usoltsev and T.N. Shamalo define innovative thinking as thinking aimed at performing innovative activities, which is carried out at the cognitive and instrumental levels and is creative, scientific and theoretical, socially positive, constructive and transformative. The practical orientation of innovative thinking is its most important feature [5, p.96].

Innovative thinking is also defined as "a special type of thinking that contributes to the creation and introduction of new tangible and intangible products in a specific sphere of human activity, inextricably linked with the desire of the subject to innovative activity for professional development and self-realization" [6, 128].

There are scientists' views on innovative thinking as a process, not an ability or qualities. Researcher I.V. Tarasova suggests the formulation of innovative thinking: "... a mental dynamic process of progressive movement from awareness of problematic meanings born of a certain situation of social practice to the creation of new meanings that transform it, not reflected in objective reality, their comprehensive cognition and subsequent implementation in this objectively existing reality" [7, p. 22].

Researcher S.V.Sokerina reveals in detail the nine components of innovative thinking [8, p.3]. The author has made an attempt to rank the components of innovative thinking and build them into an integral structure as they are formed: goal-setting, initiating, semantic, procedural, cognitive, meaningful, emotional, socially conditioning and personal.

Based on the analysis of interpretations of the concept of "innovative thinking", several key characteristics can be identified. Innovative thinking is a complex process involving many components. It is free and rational, leads to new results, to a practical solution of an existing problem in any sphere of society.

Innovative thinking should also be distinguished from the concept of "creative thinking". The concepts of "creativity" and "innovation" are similar in meaning and are used when describing the creation of something new. In the definitions of a number of authors (P. Drucker, V.P. Delia, V.K.Lukashevich, G.V. Lavrentiev, M.M. Kashapov, A.B. Khutorskoy), the similarity of innovative thinking with creative thinking is traced, but a comparative analysis can identify enough differences between them.

The author E.V. Batovrina offers a comparative analysis of these concepts according to seven criteria: essence, product, characteristic features, result, prerequisites for formation, the role of professional training of the subject, connection with the main activity of the subject [9, p. 150]. According to the author, the characteristic features of innovative thinking are a combination of intuition and logic, pragmatism, focus on getting results, close connection with the main field of activity of the subject, creative search within the sphere of professional interests. According to the author, in contrast to creative thinking, special training is required to form innovative thinking. According to the "result" criterion, innovative thinking differs in the expected (predicted) result, while the result of creative thinking is unpredictable. In addition, the prerequisites for the formation of innovative thinking, in addition to imagination and fantasy, are logic, knowledge and experience. Innovative thinking is inextricably linked with a specific type of activity, as well as with the creation of something new that has never existed before and its successful implementation. The product of innovative thinking, as well as creative thinking, is an idea, but only innovative thinking also generates technologies for the implementation of this idea.

Innovative thinking is the quality of an innovator. Sokolova A.P. and a number of researchers distinguish five skills of an innovator: synthesis of knowledge from various fields, the ability to ask questions, observation, expansion of information sources, the ability to conduct experiments [10, p. 246]. We tried to consider these skills in the context of student learning.

The skill of synthesizing knowledge from various fields, in our opinion, is provided through interdisciplinary connections of professional training, when performing project work, passing professional practice. The ability to ask questions as a skill, in our opinion, needs to be formed in daily learning activities using a dialogic learning approach. It is also necessary to create an opportunity to use this skill. Students' questions may be of a research, problematic, provocative nature, should be aimed at studying various aspects of professional activity, questioning theoretical positions. Observation skills are formed in the process of practical training, research, observation and analysis of the activities of current professionals in a particular field. The expansion of information sources implies the implementation by students of purposeful communication with teachers, university scientists, communication with students of other educational programs and courses, students' participation in scientific conferences. The ability to conduct experiments is based on the desire of students to try something new, to immerse themselves in a new environment, the desire to understand a process or phenomenon from the inside, in parts, to put and test hypotheses. This is facilitated by the participation of students in project activities, in the development of startups, performing research tasks, writing term papers and theses.

We can consider these skills as competencies that need to be formed in students for the development of innovative thinking in the learning environment.

**Materials and methods.** The purpose of the study is to determine the pedagogical conditions for the formation and development of innovative thinking among university students.

To achieve the research goal, we used methods of theoretical analysis and empirical data processing. The main method was a survey of students using the questionnaire "Innovative thinking for professional activity" developed by the authors. The survey included a number of questions aimed at clarifying students' awareness of the essence of innovative thinking, understanding its significance, its key components, and ways of its development. In some questions, a multiple choice of answers was provided, the opportunity to choose from the available ones and add your own answer. 55 students of 3-4 courses took part in the surveys. Based on the results of the surveys, mathematical data processing, quantitative results and qualitative data analysis were carried out.

**Results and Discussion.** According to the survey, an innovator, according to students, is a person who is looking for innovation (36.3%), creates innovations (32.7%), generates new ideas (27.7%), promotes innovative ideas (72.7%), organizes the process of implementing innovation based on an idea (87.2%). In general, most students understand the term "innovator" correctly, as a person who introduces innovations, solves practical issues with the help of innovations, and benefits

from the introduction of innovations. This understanding of the term "innovator" allowed most students to give the correct characterization of innovative thinking (Fig. 1).

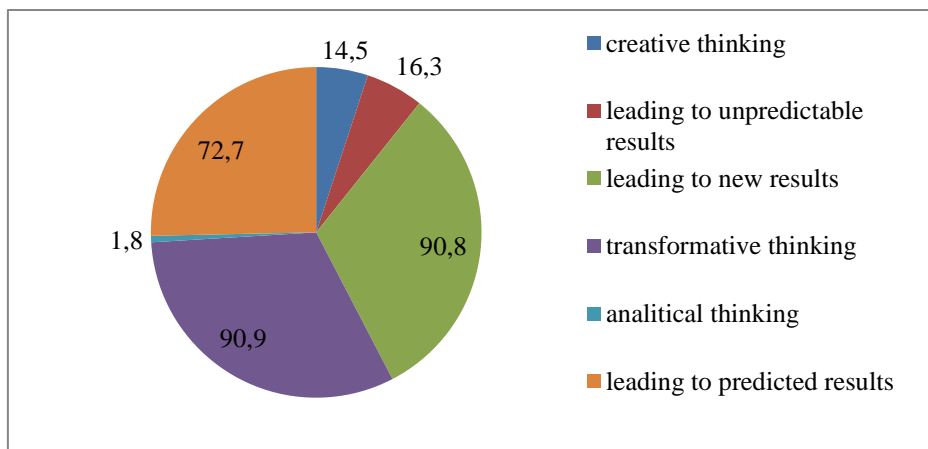


Figure 1. The concept of "innovative thinking" (survey results)

“Innovative thinking” is understood by some students as “creative thinking”, thinking that leads to unpredictable results, which is not true. Also, a small percentage of respondents consider innovative thinking only analytical (1.8%). It should be noted that the majority of students distinguish between creative and innovative thinking, choosing the options "thinking that leads to new results" (90.9%), "transformative thinking aimed at performing innovative activities" (90.9%). The correct understanding of the essence of the concept by the majority of students allowed them to highlight the skills of innovative thinking (Fig. 2).

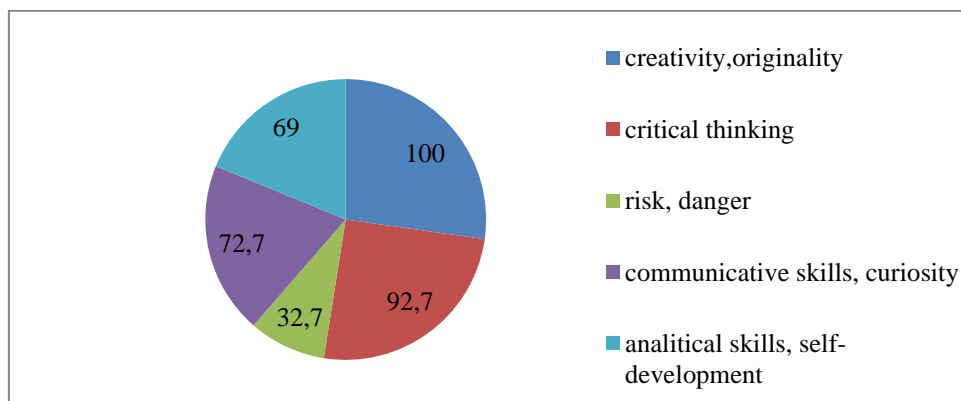


Figure 2. Innovative thinking skills (survey results)

Students primarily attribute creativity and originality (100% each), critical thinking (92.7%), problem solving ability (58.1%), communication skills and curiosity (72.7%), analytical abilities (69%), risk (32.7%), self-development (69%) to innovative thinking skills.

Almost all respondents noted the need for innovative thinking for future professional activity (94.5%) and identified a number of necessary conditions for its development. The students' answers to the question "What is necessary for the development of innovative thinking in the learning environment?" are shown in Figure 3.

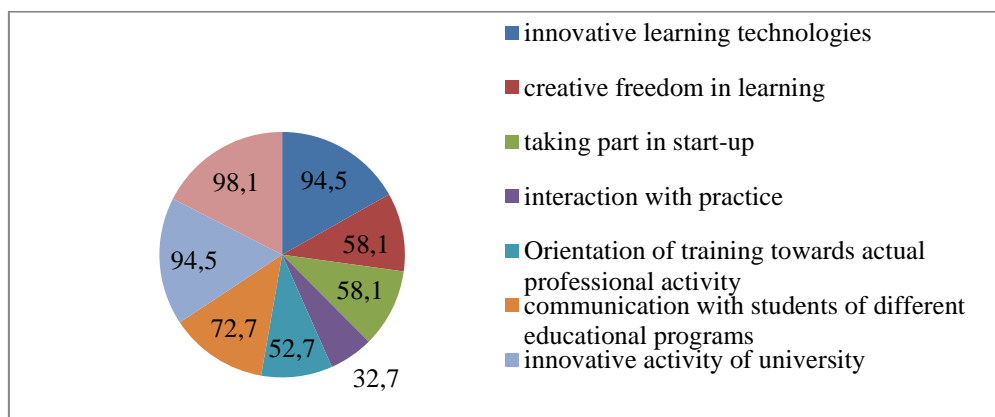


Figure 3. Conditions for the formation of innovative thinking in the learning process (survey results)

According to the survey, students are sufficiently aware of the essence and skills of innovative thinking, and are aware of its importance for professional activity.

As can be seen in Figure 2, as the dominant conditions for the development of innovative thinking in the process of learning in a university, students distinguish:

- innovative learning technologies (94.5%);
- innovative activity of the university (94.5%);
- the possibility of self-realization in training (98.1%);
- communication with students of different educational programs (72.7%);
- creative freedom in learning and participation in startups (58.1% each).

In our opinion, the majority of students noted innovative learning technologies as one of the main conditions, since they are closer to them in the period of origin, developed taking into account the characteristics of the modern generation of students, which gives more opportunities for self-realization. The innovative activity of the university is reflected in the content of educational programs, which creates an innovative educational environment for students, allows them to immerse themselves in innovative processes, be participants in research and development, and participate in startups. As for the condition "communication with students of different educational programs", this allows students to implement a collaboration on the introduction of innovations in the learning process, in the practice of professional activity from the point of view of various aspects.

The analysis of theoretical sources and the results of the survey allow us to formulate several conditions for the formation of innovative thinking of students in the course of professional training.

Firstly, the process of forming innovative thinking of students is based on the need for self-development, self-realization. The desired state in the future determines the prospect of a student's self-development, makes him actively transform his own life activity, self-actualize by searching for new opportunities, mastering new types of activities. In order to find new opportunities, the student needs to realize the current level of his development as a student, a future professional, and determine the zone of potential growth.

Secondly, the formation of innovative thinking of students should be coordinated taking into account their individuality in the learning process. This condition is closely related to the previous one, since taking into account individuality provides conditions for the student's self-realization. The personality of the student, his qualities are at the center of learning. When implementing the learning process, the student's worldview, interests, emotional sphere, personality qualities, his status in the team, etc. are taken into account.

Thirdly, the formation of innovative thinking among students is provided by the system of educational technologies. The technologies used (digital, problem-based, Case-technologies, project

method, etc.) should make it possible to develop students' ability to solve problems in their professional activities. A study by foreign researchers J.Y. Kim and other scientists reveals the positive impact of the ability to solve problems on the innovative behavior of students. The authors in their study state the importance of students' cognitive abilities being manifested in the form of behavior [11, p. 2].

Fourth, the creation of an innovative learning environment by the teacher and the university is one of the conditions for the formation of innovative thinking of students. Foreign researchers Franco P.F. and DeLuca D.A. emphasize that today, since interdisciplinarity is emphasized, teachers face the problem of how to prepare today's students to become effective members of interdisciplinary teams and leaders [12, p. 25]. In other words, the solutions are outside the usual circle of participants in the learning process.

The last pedagogical condition for the formation of innovative thinking of students is a change in the position of the teacher, moving away from the direct source of knowledge to the role of coordinator of the learning process. Training is based on the principle of student independence, the functions of a modern teacher are changing. The teacher coordinates the research activities of students, provides assistance in choosing individual educational routes, priority areas of self-development, creates conditions for creative freedom, effective communication.

**Conclusion.** Thus, the high relevance of the development of innovative thinking of future specialists is due to the change of priorities in the education system, constant changes in the labor market, the need of society for professionals who can transform the world. We can note that the success of students' future professional activity largely depends on their innovative thinking.

Innovative thinking is considered by various researchers as an ability, as a quality of personality, as a process, compared with creative thinking, opposed to it.

The purpose of our research was to determine the pedagogical conditions for the formation and development of innovative thinking among university students.

Based on the results of the study, we identified the following pedagogical conditions for the formation of innovative thinking:

1. The process of formation of innovative thinking is based on the need for self-realization of students.
2. Taking into account the individuality of the student in the learning process improves the quality of the formation of innovative thinking.
3. The formation of innovative thinking among students is provided by a system of innovative educational technologies that develop the ability to solve problems, see the prospects for innovation, develop critical thinking, creativity and other components of innovative thinking.
4. Creation of an innovative learning environment by the teacher and the university.
5. The teacher is the coordinator of the student's learning process.

The formulation of these conditions will assist teachers in the formation of innovative thinking of students in the learning process. The considered pedagogical conditions expand the possibilities of students, the learning process in the formation of their innovative thinking. The prospect of further research is a detailed study of the psychological, organizational and other conditions for the formation of innovative thinking of students in the conditions of the university.

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