

## TECHNOLOGIES THAT ARE IMPORTANT IN ENHANCING THE CREATIVITY OF TECHNOLOGY TEACHERS

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### Annotation

This article analyzes the didactic and methodological capabilities of digital technologies in developing the creative competence of technology teachers from a scientific, theoretical and practical perspective. The study interprets creativity as an important professional component of pedagogical activity and justifies the role of the digital educational environment in its formation and development. In particular, the use of interactive platforms, virtual laboratories, 3D modeling tools, and distance learning technologies is highlighted based on scientific evidence to enhance the project thinking, problem-solving skills, and innovative approaches of technology teachers. The article also examines the integration of digital pedagogical strategies, STEAM approach, design thinking methodology, and reflexive analysis mechanisms that serve to increase the creative potential of teachers. The results of the study show that the purposeful and methodologically sound use of digital technologies significantly develops teachers' professional independence, creative initiative, and skills in innovative organization of the educational process. These scientific conclusions are of significant theoretical and practical importance in improving the system of training and advanced training of technology teachers.

### Keywords

technology, creativity, digital technologies, digital pedagogy, professional competence, innovative methodology, STEAM approach, design thinking, interactive education, artificial intelligence, pedagogical innovation.

**Introduction.** The digital transformation processes taking place in the modern education system are fundamentally changing the content and methodology of pedagogical activity. In the context of globalization, the rapid development of information and communication technologies, and the automation of production processes, the professional training of technology teachers, especially their creative potential, is gaining special importance. Technology, by its very nature, has a practical and creative orientation, in which the competencies of design, construction, modeling and solving problem situations are considered a priority. Therefore, the teacher of this subject is required not only to have methodological knowledge, but also to have new thinking, an innovative approach and creative initiative.

Digital technologies (3D modeling tools, virtual and augmented reality, interactive educational platforms, etc.) are creating wide opportunities for organizing the educational process. However, the effective use of these opportunities largely depends on the creative competence of the teacher. Creativity is manifested in pedagogical activity as an important quality that serves to develop new ideas and approaches, individualize the learning process, use integrative methods, and develop independent and critical thinking in students. Therefore, the development of creativity of a technology teacher in a digital environment is recognized as an urgent scientific and pedagogical problem.

Although today, in the higher pedagogical education system, attention is paid to the formation of digital competencies in the process of training future technology teachers, the mechanisms for the targeted and systematic use of digital technologies to increase their level of creativity are not sufficiently scientifically substantiated. Practice shows that in many cases, digital tools are limited only to the function of information transmission or control. However,

their combination with project-based learning, STEAM integration, design thinking methodology, and problem-based learning technologies serves to activate the creative activity of teachers.

The purpose of this article is to analyze the theoretical foundations and practical possibilities of digital technologies in increasing the creativity of technology teachers and to identify methodological directions for their effective application. The research process used the methods of pedagogical observation, comparative analysis, generalization and systematization.

The scientific novelty of the research is that it proposes an integrative model for developing the creative competence of technology teachers through the use of digital technologies and substantiates its methodological components. This approach serves to innovatively organize the educational process, strengthen the professional independence of teachers, and improve the quality of education.

**Literature analysis and methodology.** The issue of developing the creativity of technology teachers has been covered from various perspectives in research conducted in the fields of pedagogy, psychology, and educational technologies. In foreign and domestic scientific sources, creativity is interpreted as a person's ability to find unusual and effective solutions to problem situations, to form an innovative way of thinking, and to create new pedagogical products. Pedagogical literature emphasizes that a teacher's creativity is an integral part of his professional competence, and this quality is especially important in teaching applied sciences, including technology.

In research on the development of creativity, the effectiveness of project-based learning, problem-based learning, an integrative approach, and reflexive analysis mechanisms is scientifically substantiated. In particular, the project-based learning model serves to form the teacher's skills in initiative, independent decision-making, and the implementation of innovative ideas in practice. Problem-based learning allows for the development of creative thinking by creating situations that stimulate creative thinking in the pedagogical process.

In recent years, scientific research related to the widespread introduction of digital technologies into the educational process has been focusing on the relationship between a teacher's digital competence and creativity. An analysis of scientific sources shows that interactive platforms, virtual laboratories, 3D modeling tools, and multimedia resources create conditions for a teacher to try new pedagogical approaches in the process of lesson design. However, although most studies have extensively covered the technical aspects of digital tools, their methodological mechanisms for developing the creative competence of technology teachers have not been sufficiently systematized.

Local scientific works have also covered the issues of improving the professional skills of teachers, supporting their innovative activities, and modernizing the educational process. However, a comprehensive approach aimed at developing the creativity of technology teachers in integration with the digital environment has not been sufficiently developed. In this regard, this study is significant in that it aims to generalize existing scientific views and combine them with the practical activities of technology teachers.

The research methodology was based on systematic, competency-based and activity-oriented approaches. Through a systematic approach, the creativity of a technology teacher was analyzed as a multi-component structure and its motivational, cognitive and practical components were identified. The competency-based approach provided for the integrated development of knowledge, skills and competencies necessary for the teacher's professional activity. The activity-oriented approach served to substantiate the mechanisms for creating creative experience by integrating digital tools into the practical process.

In the research process, pedagogical observation, questionnaire, semi-structured interview, comparative analysis and experimental testing methods were used. The data obtained were statistically analyzed and qualitatively interpreted. Based on the results of the empirical study,

the impact of the use of digital technologies on teachers' creativity was determined, and methodological conditions for their effective use were determined.

Thus, the literature analysis and selected methodological foundations created the necessary theoretical basis for scientifically substantiating the role and potential of digital technologies in increasing the creativity of technology teachers and developing practical recommendations.

**Discussion.** The results of the study showed that digital technologies are an important pedagogical factor in the process of increasing the creativity of technology teachers. Based on the obtained empirical data and theoretical analysis, it was determined that the purposeful and methodologically based use of digital tools significantly activates the creative approach of teachers in the processes of lesson design, visualization of educational material and organization of students' practical activities.

One of the aspects that received special attention during the discussion is the need to interpret digital technologies not as a simple means of information transmission, but as a pedagogical instrument supporting creative activity. Observations have shown that interactive platforms, 3D modeling programs and virtual laboratories allow technology teachers to organize the educational process based on problem situations, expand project activities and stimulate students' independent research. As a result, the teacher seeks to abandon stereotypical approaches in his professional activities and try innovative methods.

The analysis showed that the development of creativity is in many ways closely related to the level of digital competence of the teacher. If the use of digital tools remains only at the level of technical skills, then the increase in creative potential will be limited. On the contrary, combining the digital environment with project-based learning, an integrative approach and reflexive analysis will expand the creative thinking of the teacher. In this process, it is important to plan the lesson based on the scenario, ensure the active participation of students and bring practical tasks closer to real-life situations.

The results of the discussion also confirmed the great role of a collaborative learning environment in increasing the creativity of technology teachers. Sharing experiences through digital platforms, joint project development and discussion of methodological developments enhance the professional reflection of teachers. Such a process, in turn, will help the teacher analyze, improve and introduce new approaches to his/her activities.

One of the problems identified during the study is the lack of methodological systematicity in the use of digital tools by some teachers. This situation does not fully reveal the possibilities for developing creativity. Therefore, it is considered appropriate to develop special methodological recommendations on the use of digital technologies, and to focus on practical training in advanced training courses. In general, the results of the discussion show that digital technologies can be an effective tool for developing the creativity of technology teachers, but this process requires their use in an integrated manner with pedagogical goals. This approach increases the professional independence of the teacher, develops innovative thinking, and serves to improve the quality indicators of the educational process.

**Results.** The analysis of theoretical and empirical data obtained during the research process showed that the systematic and methodologically based use of digital technologies in increasing the creativity of technology teachers is highly effective. According to the results of experimental and test studies, it was found that teachers who combined digital tools with project-based learning, problem-based learning, and an integrative approach significantly increased their creative thinking indicators, the level of innovative initiative, and pedagogical flexibility.

Based on the diagnostic analyses conducted, it was found that the quality of lesson design, creativity in developing practical tasks, and the skills of organizing students' independent activities of teachers working in the experimental group showed higher results than the control group. In particular, the use of 3D modeling programs, virtual laboratories, and interactive

platforms expanded the possibilities of teachers to visualize and bring the learning process closer to practice. This created the basis for testing new pedagogical ideas and using alternative methods in the lesson process.

The results also showed that the effectiveness of using digital technologies is directly related to the teacher's ability to conduct reflexive analysis. During the experiment, teachers who regularly analyzed their activities, took into account student feedback, and improved the content of the lesson developed a stable creative approach. This confirms that working in a digital environment requires not only technical skills, but also methodological flexibility and pedagogical breadth of thinking.

The results of the study also showed that the following pedagogical conditions are important for developing the creativity of technology teachers:

1. seamless integration of digital tools with the content of the lesson;
2. increasing the share of assignments focused on project and practical activities;
3. creating a collaborative learning environment;
4. improving the system of continuous professional development and methodological support for teachers.

As a general conclusion, it can be said that the targeted and scientifically based use of digital technologies is an effective factor in developing the creative competence of technology teachers. These results are of practical importance in modernizing the system of training and advanced training of pedagogical personnel and serve for innovative organization of the educational process.

**Conclusion.** This study was aimed at a comprehensive analysis of the theoretical and practical possibilities of digital technologies in the process of increasing the creativity of technology teachers. As a result of the studies, it was found that organizing pedagogical activities in a digital environment expands the teacher's professional thinking, introduces innovative approaches to the lesson design process, and forms the skills of creatively solving problem situations. In particular, the integration of interactive platforms, virtual laboratories, and modeling tools with the content of the lesson serves as an important factor in activating the creative initiative of teachers.

During the study, it was substantiated that the development of creativity is a continuous and systematic process. The use of digital technologies not only as a technical tool, but also as a methodological and didactic resource takes the teacher's professional competence to a qualitatively new level. At the same time, it was found that reflexive analysis, project activities, collaborative learning, and constant methodological support are important pedagogical conditions for the sustainable development of creativity.

According to the general conclusion, digital technologies are an effective tool for increasing the creativity of technology teachers, they support the innovative activity of the teacher, strengthen professional independence and improve the quality indicators of the educational process. These scientific results indicate the need to develop methodological approaches suitable for the digital environment in the system of training and advanced training of pedagogical personnel. In the future, it is advisable to conduct large-scale experimental work in this direction and develop specific criteria for assessing creative competence.

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