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ЦИФРОВІЗАЦІЯ ЯК ЧИННИК РОЗВИТКУ ІННОВАЦІЙНОГО МИСЛЕННЯ ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ

Анотація. У статті здійснено ґрунтовний аналіз проблеми впливу цифровізації на розвиток інноваційного мислення здобувачів вищої освіти. Розкрито сутність понять «цифровізація», «інноваційне мислення». Проаналізовано нормативно-правові документи розвитку цифрової економіки та суспільства України, що вказують на необхідність інтеграції цифрових інструментів в освіту для сприяння розвитку інноваційного мислення студентів.

Окреслено виклики, пов'язані з впливом цифровізації на розвиток інноваційного мислення здобувачів вищої освіти, розв'язання яких потребує комплексного підходу, що включає підвищення цифрової грамотності, модернізацію освітніх програм у закладах вищої освіти, забезпечення рівного доступу до технологій та розвитку етичних і соціальних навичок у цифровому середовищі.

Охарактеризовано особистісні якості здобувачів вищої освіти, що пов'язані з розвитком інноваційного мислення: генерація нових нестандартних ідей; відмова від стереотипів і шаблонів; прагнення пізнавати нове; уміння за потреби використати досвід інших; здатність до аналізу, синтезу та узагальнення; оригінальність поглядів та гнучкість мислення; здатність до творчого вирішення професійних проблем; орієнтація на отримання практичного досвіду; пошук різних способів реалізації професійних ідей.

Здійснено емпіричне дослідження розвитку інноваційного мислення здобувачів вищої освіти. За результатами анкетування визначено, що цифрові технології, зокрема, освітні платформи, онлайн-бібліотеки та програми для обміну знаннями, значно покращують навчальний процес і сприяють розвитку інноваційного мислення та формуванню професійних компетентностей студентів, що є важливою складовою їхньої професійної підготовки до роботи в умовах цифрової трансформації освіти.

Зроблено висновки, що цифровізація є важливим чинником розвитку інноваційного мислення здобувачів вищої освіти, а цифрові технології є потужним інструментом для організації освітнього процесу в умовах інформатизації суспільства та полегшують засвоєння навчального матеріалу, сприяють співпраці, самореалізації та професійному становленню майбутніх фахівців.

Ключові слова: цифровізація, цифрова освіта, цифрова трансформація освіти, інноваційний розвиток, цифрові технології, цифрове середовище, інноваційне мислення, здобувачі вищої освіти.

DIGITALIZATION AS A FACTOR OF THE DEVELOPMENT OF INNOVATIVE THINKING OF HIGHER EDUCATION STUDENTS

Abstract. The article provides a comprehensive analysis of the impact of digitalization on the development of innovative thinking among higher education students. The essence of the terms «digitalization» and «innovative thinking» is revealed.



Normative and legal documents on the development of Ukraine's digital economy and society are analyzed, emphasizing the necessity of integrating digital tools into education to promote the development of students innovative thinking.

Challenges related to the influence of digitalization on the development of innovative thinking of higher education students are outlined, the solution of which requires an integrated approach, including enhancing digital literacy, modernizing educational programs in higher education institutions, ensuring equal access to technology and developing ethical and social skills in the digital environment.

The personal qualities of higher education students associated with the development of innovative thinking are characterized: generating new and unconventional ideas; rejection of stereotypes and templates; desire to learn new things; ability to use the experience of others, if necessary; ability to analyze, synthesize and generalize; originality of views and flexibility of thinking; ability to creatively solve professional problems; focus on gaining practical experience; search for different ways to implement professional ideas.

An empirical study of the development of innovative thinking among higher education students was conducted. The results of the survey indicate that digital technologies, including educational platforms, online libraries, and knowledge-sharing programs, significantly enhance the learning process, promote innovative thinking, and contribute to the formation of students professional competencies an essential component of their professional readiness for the digital transformation of education.

It is concluded that digitalization is an important factor in the development of innovative thinking of higher education students, and digital technologies are a powerful tool for organizing the educational process in the context of society informatization and facilitate the assimilation of educational material, promote cooperation, self-realization and professional development of future professionals.

Keywords: digitalization, digital education, digital transformation of education, innovative development, digital technologies, digital environment, innovative thinking, higher education students.

INTRODUCTION

The problem formulation. Digitalization is an important factor in economic, technological, educational, social, cultural and other changes in society. According to the Concept for the Development of the Digital Economy and Society in Ukraine, one of the priorities of digitalization is the development of a substantial national digital education policy, as it is a key part of the educational reform in Ukraine (Concept for the development of the digital economy and society of Ukraine for 2018-2020 and approval of the action plan for its implementation, 2018).

The Digital Agenda of Ukraine (Tsyfrova adzhenta Ukrainy – 2020) states that it is advisable to start digitalization with higher education institutions. The current realities of today require rethinking approaches to the training of higher education students in the context of the digital transformation of education. Today, the activities of higher education institutions must focus on preparing highly qualified and competitive specialists capable of successfully competing in the modern labor market. In addition, the educational process should ensure that students are trained to international standards, have in-depth knowledge in their field, are eager to innovate, think critically, and are capable of social and professional mobility, which will facilitate their integration into professional communities both nationally and internationally.

Experience has shown that in order to be competitive in the labor market, competent and successful in professional activities, it is important not only to know and master existing techniques, but also to be able to create something new, improve or modernize the existing one, which in turn requires innovation in the thinking of future professionals. All of this is the basis for training competent professionals with developed innovative thinking who can make a significant contribution to the development of modern society and education.

Analysis of recent research and publications. Scientists (V. Bykov, L. Baranovska, S. Honcharenko, O. Dzhezdzhula, A. Kolomiiets, V. Kremen, N. Kuzmina, L. Liubchak, N. Nychkalo, L. Sultanova, O. Piekhota, O. Pometun, H. Tarasenko, L. Khomych, V. Shakhov, and others) are actively exploring ways to improve professional education and implement models for introducing new innovative and information technologies. Theoretical aspects of innovative thinking, its essence, and structure have been studied in the works of both foreign and domestic researchers: A. Kharchenko, A. Hritchenko, E. Korolova, L. Kholodkova, N. Kozyriova, R. Pavlovych, O. Ponomarov, R. Pavlovych, S. Soboliev, T. Kuznetsova, and others.

THE AIM AND RESEARCH TASKS – to investigate the impact of digitalization on the development of innovative thinking among higher education students.

RESEARCH METHODS: to include analysis and synthesis, the systems method, surveys, questionnaires, generalization, and the study of normative and legal documents concerning the digital transformation of education.

RESULTS OF THE RESEARCH

The Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020 defines digitalization as the saturation of the physical world with electronic and digital devices, tools, systems, and the establishment of electronic communication exchanges between them. This process enables integral interaction between the virtual and physical worlds, creating a cyber-physical space Concept for the development of the digital economy and society of Ukraine for 2018-2020 and approval of the action plan for its implementation, 2018).

In light of this problem, we identify certain challenges related to the impact of digitalization on the development of innovative thinking of higher education students, namely: uneven access to modern digital tools, technical equipment and fast Internet; lack of digital skills, insufficient training of teachers and students to work with the latest digital technologies; lack of integration of digital technologies into curricula in such a way that they contribute to the development of innovative



thinking. It should be noted that excessive use of digital technologies can reduce the ability to reflect and analyze systems. Distance learning and constant interaction with technology can lead to a decrease in interpersonal communication and teamwork, productivity, and the development of critical and innovative thinking. Addressing these challenges requires a comprehensive approach, including improving digital literacy, modernizing educational programs in higher education institutions, ensuring equal access to technology, and developing ethical and social skills in the digital environment.

We believe that the digitalization of higher education should begin with the creation of basic information services used in the educational process; digital libraries that provide access to scientific literature for students or teachers from any device, regardless of location and time of day; stimulating the creation of new digital communities and innovations at all stages of education (Tsiuniak, O.P., Dovbenko, S.Iu., Verbeshchuk, S.V., 2024, 644-657).

Participants in the educational process must be up-to-date with modern technologies, be able to use the latest digital tools, create a digital environment, and be able to protect personal information in the digital space.

Digital technologies are a tool that is actively used in education and contributes to improving its quality and developing innovative thinking in future professionals, as well as provides an opportunity not only to gain knowledge but also to develop practical skills, actively participate in the process of creating, analyzing and using digital resources.

The essence of the concept of «innovative thinking» is interpreted differently in the scientific literature. In the study of R. Pavlovich, innovative thinking is considered as thinking that is able to penetrate the essence of things and phenomena (Pavlovych, O. R., 2019, 199-212). This approach allows higher education students not only to analyze the available information, but also to form their own ideas that contribute to the search for new, extraordinary solutions to professionally important tasks. Thanks to this, students develop creativity, flexibility in thinking and the ability to adapt to difficult situations.

According to K. Gorasz, innovative thinking is an active way of perception, comprehension and evaluation of objects, based on personal understanding and assessment of the external world; it is associated with the need to make non-standard decisions in non-standard situations and ensures the development and mastering of new models of interaction between subjects (Komar, T.V., Varhata, O.V., 2022, 333-344).

Researcher S. Soboleva identifies the main characteristics of innovative thinking, including

- expansion of the function of thinking: the ability to fantasize and generate non-standard ideas;
- identification of the key problem, the ability to see it in relation to other elements;
- rejection of stereotypes and patterns, going beyond traditional concepts;
- resolution of contradictions, ability to effectively resolve conflicts;
- understanding of systemic processes to predict their future development.
- Integration of knowledge from different areas and industries to create new solutions;
- optimization of resources, search for the best means to implement new ideas;
- practical focus, orientation towards achieving specific results;
- search for alternative ways to realize ideas (Sobolieva, S. M., 2020, 271-275).

Thus, thanks to the ability to generate new ideas, analyze systems and predict their development, move away from stereotypes and use an integrative approach to solving a problem, higher education students can find effective ways to solve complex professional problems, new opportunities for implementing ideas in real life.

Having carried out a theoretical analysis of modern scientific works, we can distinguish the following personal qualities of higher education students related to the development of innovative thinking: generation of new non-standard ideas; rejection of stereotypes and templates; desire to learn new things; ability to use the experience of others and the desire to improve one's own; ability to analyze, synthesize and generalize; originality of views and flexibility of thinking; ability to creatively solve professional problems; focus on gaining practical experience; search for different ways of implementation.

For a thorough analysis of this problem, we developed our own questionnaire «The Impact of Digitalization on the Development of Innovative Thinking of Higher Education Students». The questionnaire included open-ended questions: How often do you use digital technologies in the educational process? Which digital technologies do you use most often? Do you feel that digital technologies help you to better master the educational material? What aspects of thinking do you think are most developed through digital technologies? How would you rate the impact of digital technologies on the development of your innovative thinking on a scale from 1 to 5 (where 1 is not different, 5 is significantly different)? What difficulties do you face when using digital technologies in education? In your opinion, are there enough digital technologies in your higher education institution to develop innovative thinking? What digital tools do you consider the most effective for the development of innovative thinking?

According to the survey, we found that 65% of respondents actively use digital technologies; 25% of respondents use them several times a week, and 10% use them less often.

Higher education students provide a list of digital technologies that they most often use in their studies. It is shown in Figure 1.

According to 85% of respondents, digital technologies help to better master the educational material, 10% of respondents say that they help partially, 5% of respondents do not help. 60% of respondents believe that the use of digital technologies helps to develop creativity, 30% of respondents believe that it helps to develop critical thinking, and 10% of respondents do not know. 50% of respondents believe that digital technologies have a significant impact on the development of innovative thinking, 30% of respondents are convinced that digital technologies have an average impact on the development of innovative thinking, and 20% of respondents believe that they have a minor impact.

Students identify certain difficulties that arise when using digital technologies in education. Let's visualize it in Fig. 2.

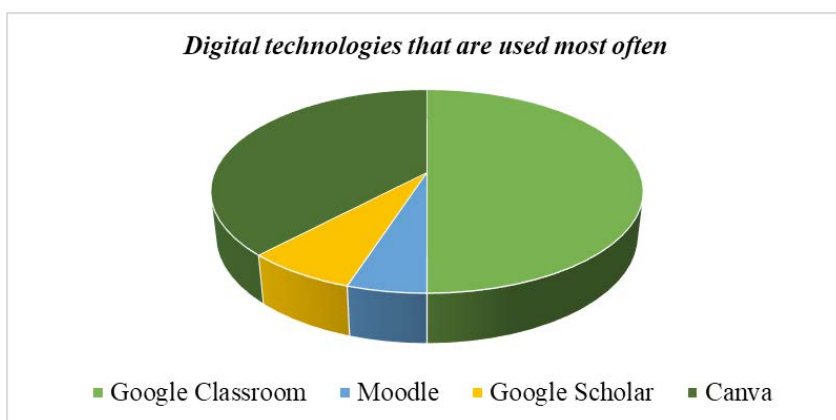


Fig. 1 . Digital technologies used most often

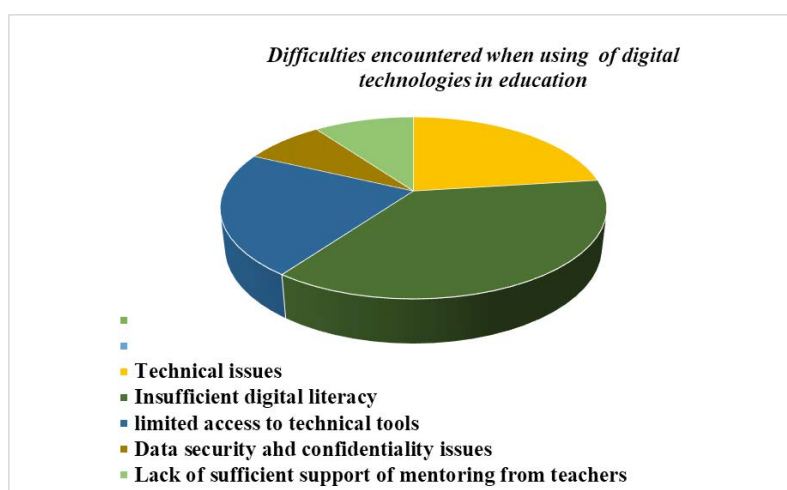


Fig. 2. Difficulties encountered when using of digital technologies in education

When asked whether digital technologies are sufficient in your higher education institution to develop innovative thinking, 60% of respondents said that they are sufficient, 30% of respondents - partially, and 10% of respondents - insufficient.

The most effective digital tools for the development of innovative thinking, according to higher education students, are knowledge sharing programs (Google Workspace, Microsoft Teams) (45% of respondents), virtual laboratories (20% of respondents), and educational platforms (35% of respondents).

Thus, the study demonstrates a high level of use of digital technologies among higher education students. Educational platforms, online libraries, and knowledge sharing programs have the greatest impact on the learning process. However, technical problems and insufficient skills in working with digital resources remain the main challenges. At the same time, students note the positive impact of technology on the development of critical, analytical, and innovative thinking, which contributes to their professional growth.

We believe that the innovative thinking of higher education students is effectively developed in the process of their education in the modern information space. Therefore, it is necessary to provide access to information resources, including the use of electronic libraries, online learning platforms and databases that promote the development of independent search and analysis of information. It is advisable to develop critical thinking skills, as students should learn to evaluate information from various sources, form their own opinions and retain innovative solutions. It is also worth using interactive teaching methods: project work, discussions in online environments, which will help stimulate creative and innovative thinking, engage in practical tasks and participate in research.

CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCH

Thus, from the above, we can conclude that digitalization is an important factor in the development of innovative thinking of higher education students. We believe that digital technologies are a powerful tool for organizing the educational process in the context of the informatization of society and the digital transformation of education.

They increase the effectiveness of independent work of higher education students and make it possible to introduce innovative forms and methods of teaching and education in future professional activities. Digital technologies facilitate the assimilation of educational material and promote cooperation, self-realization and professional development of future specialists. In addition, they ensure active and conscious learning, increase motivation, develop communication



skills, and form professional competencies. Mastery of digital technologies allows future professionals to be prepared for the challenges of modern society and to promote the development of innovative thinking, creativity and other important skills in their students.

Digital education in Ukraine is a key factor in ensuring the country's sustainable development and the formation of a digital society. To move to a qualitatively new level of digital education, it is necessary to consolidate the efforts of the government, educational institutions, and the public.

We see prospects for further research in the creation of instructional and methodological materials for teachers of higher education institutions that promote the effective use of digital resources to develop innovative thinking, professional competencies, cooperation skills, teamwork, and digital literacy.

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