

# THE FORMATION OF FUTURE TEACHERS PROFESSIONAL READYNES TO INNOVATION ACTIVITY BY MEANS OF DIGITAL TECHNOLOGIES

## LA FORMACIÓN DE FUTUROS DOCENTES PREPARACIÓN PROFESIONAL PARA LA ACTIVIDAD DE INNOVACIÓN MEDIANTE TECNOLOGÍAS DIGITALES

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### ABSTRACT

The training of future specialists for innovation activity is a leading trend of modern higher pedagogical education, which is due to the integration of Ukraine into the European educational space. The article actualizes the problem of future teachers' professional readiness formation for innovation activity using digital technologies. General science, synthesis, comparison, analysis, generalization and systematization of studies of domestic and foreign scientists are employed. Based on the results, the essence of the concept "professional preparedness of future teachers for innovation" has been revealed. It has been found that the professional readiness of future teachers for innovation is the outcome of integrative personal education, and professional training, featured via a blend of cognitive (knowledge regarding the concept of the innovation and profession), motivational (incentives for interests and innovation), reflexive (capability of analyzing results), innovative activity and praxeological (innovation competence actualization) elements that permit conducting professional tasks of innovative nature. It has been concluded that a modern teacher can't conduct educational actions with no utilizing advanced digital technologies, and the education informatization comprises enhancing the future teachers' training in the information educational environment of higher education institutions.

**Keywords:** informatization of education; future teachers; digital technologies; digital competence; professional training.

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## RESUMEN

La formación de futuros especialistas para la actividad de innovación es una tendencia líder de la educación pedagógica superior moderna, que se debe a la integración de Ucrania en el espacio educativo europeo. El artículo actualiza el problema de la preparación profesional de los futuros docentes para la actividad de innovación utilizando tecnologías digitales. Se emplean la ciencia general, la síntesis, la comparación, el análisis, la generalización y la sistematización de estudios de científicos nacionales y extranjeros. Con base en los resultados, se ha revelado la esencia del concepto “preparación profesional de los futuros docentes para la innovación”. Se ha encontrado que la preparación profesional de los futuros docentes para la innovación es el resultado de una educación personal integradora y una formación profesional caracterizada por una combinación de factores cognitivos (conocimiento sobre el concepto de innovación y profesión), motivacionales (incentivos por intereses e innovación) elementos reflexivos (capacidad de análisis de resultados), actividad innovadora y praxeológicos (actualización de la competencia innovadora) que permitan realizar tareas profesionales de carácter innovador. Se ha concluido que un docente moderno no puede realizar acciones educativas sin utilizar tecnologías digitales avanzadas, y la informatización de la educación comprende potenciar la formación de los futuros docentes en el entorno educativo de la información de las instituciones de educación superior.

**Palabras clave:** informatización de la educación; futuros docentes; tecnologías digitales; competencia digital; formación profesional.

## INTRODUCTION

The facts of the today's world, the evolving procedures in the education system, the social arrangement of the labor market promote the revision of particular established perspective on the aims and prospects of higher education generally and the training of prospective teachers in particular. After all, modern Ukrainian communities require experts with creative thinking and a long to conduct their opinions in public life, due to political, information, social, economic, religious and cultural procedures of the third millennium. There is a growing need for professionals who have digital skills and are able to adapt quickly to the ever-increasing demands of the information society (Yaroshenko et al., 2022).

Today's fast-paced world needs young individuals the capacity to react properly and swiftly to innovative alterations occurring in societies, to be self-sufficient, responsible citizens, proactive, prosperous individuals, in other words, professionally qualified and information literate. The experience shows that a contemporary educator can't conduct educational actions and tasks without utilizing digital tools and technologies. Services, including mobile phones, Internet search, e-mail, and video calls, are getting indispensable and worldwide (Anisimova et al., 2020).

Nowadays, digital technology is a tool that is commonly utilized in education and helps to improve its quality. The need for transformations in pedagogical education is defined in the legal documents, namely: the laws “On Education”, “On Higher Education”; decrees of the President of Ukraine “On measures to improve the higher education system of Ukraine”, “On measures to develop the national component of the global information network Internet and ensure wide access to this network in Ukraine”, “On the National Strategy for Education in Ukraine until 2021”; in the Concept of

development of pedagogical education, the Concept of development of digital economy and society of Ukraine for 2018-2020; regulations on electronic educational resources.

It is necessary to note that from today's standpoint higher education institutions should pay considerable attention to the training of a competent, responsible specialist, competitive in the labor market, professionally ready to work effectively in the chosen specialty at world standards, capable of social and professional mobility, to permanent professional growth and self-improvement. That is why the problem of future teachers' professional readiness formation for innovation activity by means of digital technologies is relevant.

## **METHODS**

A wide range of methods are taken into account to meet the study's aim, including:

- general science - analysis, comparison, synthesis, generalization and systematization of studies of domestic and foreign scholars, legislative support, etc.;
- specifically scientific - interpretations to calculate the founamental concepts of the study, prognostic analysis to determine the prospects for further research;
- empirical - surveys to identify problems in future teachers and professors of higher education institutions related to the use of digital technology.

## **RESULTDS AND DISCUSSION**

In the frames of given research, it is needed to determine the conceptual apparatus within the specified problem. The study uses the term "*readiness*" which is defined as the presence of abilities (B. Ananiev, S. Rubinstein), personality qualities (K. Platonov), psychological state, an essential feature of the installation (D. Unadze), the psychological condition for successful performance (I. Ladanov), a holistic phenomenon, bonded beliefs, moral and volitional qualities of personality, ways of behavior, knowledge of the profession and practical skills and abilities (R. Romanenko; V. Serikov). The essence of the concept of "professional readiness" in the dimension of modern science has been described. To clarify the content of this concept, the method of contextual analysis as a research tool has been used. It provides a step-by-step procedure for the study of a certain category (concept, pedagogical phenomenon) in the system of psychological and pedagogical sciences (Dubasenyuk, 2010; Borodina et al., 2019).

In the explanatory dictionary of the Ukrainian language the definition "*readiness*" is explained as a desire to do something (Explanatory dictionary of the Ukrainian language, 2012). In the dictionary of psychological and pedagogical concepts and terms, "*readiness*" is interpreted as a state of personality that allows him to successfully enter the professional environment, to develop rapidly professionally (Nevid, 2012).

In order to systematize and define the nature of the "*innovation*" concept the method of content analysis has been used. It has been covered 57 different sources: philosophical, psychological and pedagogical encyclopedias, dictionaries, monographs, dissertations, manuals. In accordance with the requirements of content analysis, the semantic units that were part of the structure of the definition of the studied concept have been distinguished, namely: process, system, activity, changes, result, technology, innovation, etc.

The generalized results of the content analysis are presented in the table 1.

Table 1. The results of content analysis of the concept “innovation”

<b>Categorical feature of the concept “innovation”</b>	<b>Number of semantic units of the analysis (%)</b>	<b>Options for interpreting the concept “innovation”</b>	<b>Number of semantic units of the analysis (%)</b>
Novelty	29.6	Process	31.8
Practical implementation	21.4	System	28.7
Sustainable results	19.5	Activity	24.3
Purposefulness	16.8	Changes	19.4
Complexity	13.4	Result	18.6
Social conditionality	9.7	Technology	13.5
Progressiveness	7	Innovation	12.3

Summarizing and systematizing the views of scientists, the unique definition of the essence of the concept “*innovation*” has been proposed. It has been decided that innovation is a main and beneficial procedure of bringing new perspectives into the professional training system, contributing to its enhancement and the accomplishment of a quality outcome by educational process’s subjects.

Considering the logic of given study, it seems crucial to outline the essence of the concept “innovation activity”. Scientific researches prove that one of the types of pedagogical activity is innovation pedagogical activity, which, as scientists note, contributes to the renewal of the pedagogical process and is characterized by high pedagogical creativity. Thus, O. Goncharova notes that this is “a systemic activity aimed at implementing innovations based on the use and implementation of new scientific ideas, knowledge, approaches or transformation of known research results and practical developments into a new or improved product” (Goncharova, 2014).

The Law of Ukraine “On innovation activity” refers to the direction of innovation in the creative implementation of research and development and promotes the formation and release of new competitive products and services (Dietrich & Blue, 2002).

In this aspect, it should be considered that the *innovation activity* of future teachers is a requirement of modern education, an important component of professional growth of the future specialist. The important aspect of this study is that future teachers, in contrast to specialists in other specialties, gain knowledge in many disciplines. Because they will teach various subjects - mathematics, science, writing, reading, drawing, singing, labor training, will organize subject mornings, educational activities, etc. In addition, the future teacher is a teacher of pedagogy and methods of primary education (pedagogical disciplines). The modern teacher is at the same time the developer of educational programs, the researcher of pedagogical process, the organizer of educational activity, the public figure, the agent of changes, the manager, the moderator, the trainer, the tutor, the coach, the facilitator (Tsiuniak, 2020a).

It has been considered that in the conditions of distance learning in higher education institutions

caused by the spread of coronavirus infection SARS-CoV-2 (pathogen COVID-19), it is advisable to form a professional readiness for innovation activity through digital technology. As practice shows, a modern teacher must have innovative practices for the introduction of adaptive, mixed, distance, cloud and mobile learning, and so on.

It should be mentioned that there stands not a single approach to the definition of “*digital technology*”, so it is interpreted as the processing and transmission of information using coding symbols used in computer technology. Scientists are actively exploring the essence of the concept “*digital technologies*”. Therefore, O. Bernazyuk defines “digital technologies” as technologies in which digital signals are used to transmit information (Bernazyuk, 2017), and M. Zhurba characterizes them as “encoded in discrete signal pulses” (Zhurba, 2013).

It has been agreed with N. Morse’s reasoning that when designing “digital activity” the teacher focuses on the formation and development of higher education students’ skills necessary for a successful career, namely: complex problem solving, critical thinking, creativity, ability to cooperate, emotional intelligence, negotiation, cognitive flexibility (Morse et al., 2013; Blyznyuk, 2018).

The monitoring of online resources made it possible to identify digital tools that are actively used in the training of future teachers in higher education institutions. It is worth noting that since 2019, the Vasyl Stefanyk Precarpathian University has launched the Center for Innovative Educational Technologies “PNU EcoSystem” (<https://ciot.pnu.edu.ua>) within the project of the EU program Erasmus + KA2 “Modernization of higher pedagogical education in the use of Innovative Teaching Tools (MoPED)” (№586098-EPP-1-2017-1-EN-EPPKA2-CBHE-JP) in accordance with the requirements of the Laws of Ukraine “On Higher Education” (2014), “On Education” (2017), “On general secondary education” (2018); and in order to implement the main provisions of the Concept of development of pedagogical education (2018), the Concept of “New School. Space of educational opportunities” (2016), the National Doctrine of Education Development of Ukraine in the XXI century. (2002), the National Strategy for the Development of Education in Ukraine for the period up to 2021 (2013), the State Standard for Primary Education (2018), etc.

The discussion subject is the problems of innovative procedures in modern education, social issues of mixed and distance learning, the utilization of Smart-technologies in the educational process, digital tools and the creation of simple and complex infographics, 3D-visualization of educational material using augmented reality technology. Lepbooking for research training, implementation of formative and final evaluation of learning outcomes, preparation of educational materials on the LearningApps platform, creation of interactive posters, development of critical thinking to counteract manipulations and fakes in the media space, etc. Classes are held online using Cisco WebEx video conferencing (Tsiuniak, 2020b).

Within the article the digital tools as most often used in the training of future teachers have been described. One of the tools for setting up a learning problem, organizing independent work, summarizing the material studied and summarizing is **Google Drive**, which allows users to store information on servers in the cloud and share it with other users on the Internet. Files can be accessed from any device that has an Internet connection, and changes are saved automatically. Google Drive includes Google Docs, Spreadsheets and Presentations, an office suite that lets you edit documents, spreadsheets, presentations, pictures, and more. Note that this tool can be used in various disciplines (lectures, practical classes). Applicants for higher education have the opportunity to synchronously

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and asynchronously process educational material, analyze and learn it.

In terms of distance learning, the service **LearningApps.org** has gained popularity. It is a tool for testing and consolidating knowledge, the formation of critical thinking. It is easy to use and allows to create interactive tasks of different levels of difficulty: quizzes, crossword, puzzles and games. Students can create tasks on their own, and can also perform tasks prepared by the teacher. The main advantage of the service is that applications are created exclusively in Ukrainian.

**MindMeister** is a unique tool for organizing group work and reflection. It is a service that allows to create intelligence maps, the use of which in the educational process provides feedback, in particular, through the final and formative assessment.

The use of online tools with the help of gadgets is effective in the professional training of future teachers. For example, **Nearpod** is an online tool that allows teachers to create individual tasks and track their performance using mobile devices. The peculiarity of this service is that users have the opportunity to connect to Nearpod 3D and Nearpod VR.

It is interesting to use the **Kahoot** learning platform, which allows to create, play, open and share interesting didactic games in minutes.

Virtual boards are used to quickly obtain data from students. For example, **Padlet** is one of the services that allows all participants in the educational process to work together on a web wall to which you can attach files, photos, site calls, and more. The wall can be moderated by several participants, access for reading and editing can be open to anyone.

To recognize the efficiency of employing digital technologies in the training of future teachers, a survey of applicants for higher education at the Faculty of Education of Vasyl Stefanyk Precarpathian National University has been conducted. 180 full-time and part-time students took part in the survey.

The survey has been raised the following questions:

1. Do you have knowledge about the possibilities and purpose of digital technologies?
2. Is there a need to utilize digital tools and means in the educational procedure of higher education institutions?
3. Should we use digital technology constantly?

In fig. 1 the results of the survey have been presented.

It should be stated that 85% of respondents positively assessed the possibilities of using digital technologies in the educational process.

The survey was also conducted among teachers of higher education institutions. 75% of respondents said that digital technologies improve the system of control over the educational activities of higher education students and provide an opportunity for interpersonal interaction of all participants in the educational process during distance learning.

Thus, the basic requirements for the use of digital means and tools in the educational procedure of

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higher education organizations have been identified. They are: the determination of the role, place and time of digital resources and teaching aids usage; the motivation of all participants in the educational process to use digital technologies; the updating teaching methods using digital tools; providing individualization and feedback in the process of professional training; organization of joint work of participants of educational process in virtual educational environment. It is necessary to form in future teachers' special competencies, which include: the ability to systematize and critically analyze the information found on the Internet; ability to control "multimedia flow" using digital technologies; create and edit digital content in various formats, self-expression by digital means; ability to use mobile applications and digital educational technologies.

## CONCLUSIONS

Thus, with the above mentioned it can be concluded that digital technologies assist the formation of an creative digital ambiance in higher education organizations; severely communicative relationships of all members of the educational procedure, generation circumstances for cooperation, reflection, and self-realization; boost conventional teaching techniques with creative means of information presentation; supply cooperative and informational communication for the learning procedure. The process of learning interaction with utilizing digital means is getting more resilient, accessible, and personalized. Especially in the conditions of distance learning due to the outbreak of coronavirus infection SARS-CoV-2 (pathogen COVID-19) increases the necessity for students and teachers' interaction in the conventional way and also with utilizing digital tools and technologies. The future teacher must be fluent in modern digital technologies and use them in their professional innovation.

The prospects for further research are to characterize the digital competence of the modern teacher of higher education.

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