

DDC УДК 378.091:3:37.011.3–051:614]:004.9

DIGITALIZATION OF THE EDUCATIONAL PROCESS AS A MEANS OF INCREASING THE QUALITY OF HEALTH-PRESERVING COMPETENCE OF FUTURE TEACHERS IN THE CONTEST OF PANDEMIC COVID-19

Valentyna Bilyk,

Doctor of Pedagogical Sciences, Associate Professor,
National Pedagogical Dragomanov University,

Kyiv, Ukraine,

ORCID ID 0000-0002-6860-7728,

valya-bilyk@ukr.net

Annotation. *The article presents results of a research of the importance of digitalization in Ukrainian education in the context of the COVID-19 pandemic. The concept of «health-preserving competence of future teachers» is interpreted as integrative quality of personality that is a result of valeological, medical-biological, science and professional preparation in higher education institutions, is characterized by the formation of a holistic system of knowledge, skills, abilities about health, helps to increase the level of professional, cultural competence and ability to perform future professional duties. It is hypothesized that the quality of future teachers' health-preserving competence formation will significantly improve if the educational process is digitalized on the basis of SMART- and BYOD- technologies. It is noted that the results of the pedagogical experiment allowed to identify significant positive dynamics of changes in the level of health-preserving competence of students in the experimental groups in comparison with the control and to confirm the correctness of the hypothesis. Prospects for further research are outlined, which are to study the experience of higher education institutions in developed countries to create educational and methodological support for the formation of health-preserving competence of future teachers in a pandemic.*

Keywords: *digitalization; health-preserving competence; future teachers.*

ДІДЖИТАЛІЗАЦІЯ ОСВІТНЬОГО ПРОЦЕСУ ЯК ЗАСІБ ПІДВИЩЕННЯ ЯКОСТІ ФОРМУВАННЯ ЗДОРОВ'ЯЗБЕРЕЖУВАЛЬНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ВЧИТЕЛІВ В УМОВАХ ПАНДЕМІЇ COVID-19

Валентина Білик,

доктор педагогічних наук, доцент,

Національний педагогічний університет імені М. П. Драгоманова,

м. Київ, Україна,

ORCID ID 0000-0002-6860-7728,

valya-bilyk@ukr.net

Анотація. *У статті репрезентовано результати досліджень щодо значення діджиталізації освітнього процесу у закладах вищої освіти України в умовах пандемії COVID-19. Конкретизовано поняття «здоров'язберезувальна компетентність майбутніх вчителів», що витлумачено як інтегративна якість особистості, яка є результатом*

валеологічної, медико-біологічної, природничо-наукової та професійної підготовки у закладах вищої освіти, характеризується сформованістю цілісної системи знань, умінь, навичок про здоров'я та здоров'язбереження, сприяє підвищенню рівня професійної, загальнокультурної компетентності й можливості якісно виконувати майбутні професійні обов'язки. Висловлено гіпотезу про те, що якість формування здоров'язбережувальної компетентності майбутніх вчителів значно покращиться за умови діджиталізації освітнього процесу на засадах SMART- та BYOD-технологій. Зазначено, що результати педагогічного експерименту дозволили виявити значну позитивну динаміку зміни рівня сформованості здоров'язбережувальної компетентності студентів в експериментальних групах в порівнянні з контрольними та підтвердити правильність висловленої гіпотези. Окреслено перспективи подальших досліджень, які полягають у вивченні досвіду закладів вищої освіти розвинених країн світу щодо створення навчально-методичного супроводу процесу формування здоров'язбережувальної компетентності майбутніх вчителів в умовах пандемії COVID-19.

Keywords: діджиталізація; здоров'язбережувальна компетентність; майбутні вчителі.

Relevance of the research. The need for dynamic qualitative changes in the system of future teachers valeological (health-preserving) education in Ukrainian higher education institutions is caused, on the one hand, by modern society's demands for competent and highly qualified specialists, and on the other – reforms that take place in higher education system of the country in the context of its integration into global educational space, where, the requirements for the training of future professionals, including future teachers are no longer limited to mastering professional knowledge and mastering professional skills, and the priority is to form a comprehensive developed personality, creative and capable of innovative activity, self-improvement and self-development.

COVID-19 and the 2020 pandemic constraints have almost completely changed the nature of education market. Coronavirus and quarantine measures to prevent its spread have launched new trends both in the implementation of valeological (health-preserving) education and in the organization of the educational process in higher education institutions. As a result of the pandemic and the quarantine caused by it, digitalization, online resources and distance learning platforms have become the only possible way to continue the educational process in higher education institutions.

Analysis of recent research and publications. Scientific interest to the problem of digitalization of educational process was shown by such scientists as: L. Chumak, who introduced the author's interpretation of the concept of «digitalization of pedagogical education», in particular the scientist interpreted it as a process of transition to electronic learning system theoretical and methodological basics for digital didactics» (Chumak, 2021); O. Litvinov, considered digitalization in the context of changing human development (according to the scientist, «digitalization is a phenomenon that causes successive transformations of the socio-cultural code, united by a common vector of development») (Litvinov, 2020); O. Zhernovnikova expressed the opinion that «digitalization in education is a fundamental factor of economic growth in modern conditions» (Zhernovnikova,

2018), V. Bilyk, Y. Bilyavskaya, V. Wember, N. Gubriy, N. Dobrovolskaya, exploring various aspects of digitalization of the educational process in national and foreign higher education institutions, concluded that SMART- and BYOD-technologies are especially popular during its implementation (*Bilyk, 2020; Bilyavska, 2018; Wember, 2019; Gubriy, 2014; Dobrovolska, 2014*).

In the course of their research, the scientists singled out positive aspects of the introduction of SMART-technologies in the educational process, namely: «promoting students' interest in learning, the effectiveness of knowledge acquisition and creative development» (*Gubriy, 2014*); opportunity for students to «fully focus on the essence of the lecture material (there is no need to summarize it in detail, because after the lesson you can get an electronic version)» and teachers «do not spend time writing assignments, creating drawings and diagrams on the board, and use software capabilities» (*Dobrovolska, 2014*); increasing students' interest in scientific and medical-biological knowledge, motivation to master them, the quality of formation of creative thinking and the ability to find different ways to solve one problem (*Bilyk, 2020*).

BYOD-technology, according to scientists, should be used to develop students' motivation for educational activities and increase their activity in the process of such activities (*Bilyk, 2020*); as an additional source of information for the organization of diagnostics of efficiency of students' educational activity and during creation by teachers of interactive exercises for students (*Bilyk, 2020; Wember, 2019*); during the performance of students of various classroom and independent extracurricular tasks (*Bilyavska, 2018*).

We agree with the above opinions of scientists and, given the needs of today, we consider it appropriate to investigate the impact of digitalization on the formation of health competence of future teachers in national higher education institutions in the COVID-19 pandemic.

Formulation of the purpose of the article. Justify the feasibility and experimentally test the effectiveness of digitalization of the educational process as a means of improving the quality of health competence of future teachers in a pandemic COVID-19.

Research methodology. It is known that one of the responsible stages of the study is the choice of methods for its implementation. Therefore, when choosing research methods, we first assessed the degree of their necessity, objectivity, reliability and validity. Given the above, it was decided to use a set of methods, namely: theoretical: analysis of scientific and methodological literature – to determine the state of study of the problem; comparative analysis, comparison and generalization – to systematize the results of the study, formulate conclusions and determine areas for further research. The empirical part of the study was conducted using specially developed tests and diagnostic card, as well as methods: Yu. Orlova «The need to achieve the goal», T. Dubovytska «Diagnosis of learning motivation», V. Rusalova «Measuring the level of emotionality», M. Obozova «Self-assessment of willpower», A. Karpov and V. Ponomareva «Measuring the level of reflexivity». In order to analyze the data of the experimental study, the author's computer program

«BSSL: pedagogical diagnosis of the readiness of future teachers for health education» (Bilyk, 2015) was used.

Results of the research. Given that there is currently no generally accepted definition of «health-preserving competence of future teachers», we consider it appropriate to specify this definition in our study.

Thus, the health-preserving competence of future teachers is considered by us as an integrative quality of personality, which is the result of valeological, medical-biological, science and professional training in higher education institutions, characterized by the formation of a holistic system of knowledge, skills, health and health skills, helps to increase the level of professional, cultural competence and the ability to perform future professional duties.

In the author's version, the health-preserving competence of future teachers is indicated by the need-sense, cognitive-intellectual, functional-competence, personality-regulatory and reflexive-analytical criteria with the corresponding indicators.

Indicators of the need-sense criterion are: awareness of students, future teachers, the importance and significance of valeological (health-preserving) education; understanding the needs and values of valeological and medical-biological knowledge, skills and abilities in solving life situations, substantiation of professional decisions, raising the level of culture, competitiveness in the labor market, development of creative potential; formation of motivation to study valeological and medical-biological disciplines; interest in continuing valeological (health-preserving) education; cognitive-intellectual criterion – awareness of modern achievements in the fields of pedagogy, valeology, biology, medicine; formation of a holistic system of consciously mastered valeological knowledge; functional-competence criterion – the ability to apply the theoretical provisions of valeological and medical-biological training in the process of professionally oriented educational activities; ability to use the obtained valeological and medical-biological knowledge, skills and abilities in solving practical problems; personality-regulatory criterion – focus on achieving success in self-organization and self-regulation of their own valeological training; manifestation of strong-willed efforts and persistence to achieve the desired results in the process of such training; formation of a sense of satisfaction with the opportunity to apply the results of valeological (health-preserving) education in professionally oriented educational and future professional activities; reflexive-analytical criterion – the ability to consciously comparative analysis of the initial, current and final results of mastering valeological and medical-biological knowledge and mastering skills and abilities; ability to exercise self-control, self-recognition and self-assessment of one's own achievements in the process of valeological (health-preserving) education.

In order to identify the initial level of development of future teachers' health-preserving competence, we conducted pilot studies on the above criteria. The sample size was 486 students of pedagogical higher education institutions.

Component-by-component analysis of the pilot study data shows that the highest results were obtained by personality-regulatory and reflexive-analytical indicators (table 1).

Thus, according to personal-regulatory indicators, the majority of respondents (159 people, or 33% of respondents) showed a high level of health-preserving competence; the medium level was noted in 145 people (29% of respondents); at below average and low level, personal-regulatory indicators of health-preserving competence are formed in 19% of people – 91 students, respectively.

Table 1

Results of indicators of the formation future teachers' health-preserving competence (pilot study)

<i>№</i> <i>Sl. No</i>	Criteria for future teachers' health-preserving competence	High	Medium	Below medium	Low
1	Need sense	108/22%	74/16%	101/20%	203/42%
2	Cognitive-intellectua	52/9%	226/49%	50/8%	158/34%
3	Functional and competence	73/12%	192/41%	43/9%	178/38%
4	Personality-regulatory	159/33%	145/29%	91/19%	91/19%
5	Reflective-analytical	162/34%	135/28%	128/27%	61/13%

According to the reflective-analytical group of indicators, 34% of respondents (162 people) showed a high level of health-preserving competence, 27% of respondents (128 people) – below medium. At the same time, a significant proportion of future teachers had medium (28% – 135 people) and low (13% – 61 people) levels of reflexive-analytical indicators of health-preserving competence.

The formation of health-preserving competence in terms of needs-sense, cognitive-intellectual and functional-competence indicators was lower.

Cognitive-intellectual indicators of the majority of students (226 people, which is 49%) showed medium level of health-preserving competence. The low level of formation of indicators was recorded in 158 people, which was 34% of the whole group. And only 9% (52 students) showed a high level of health-preserving competence in terms of cognitive-intellectual indicators. At a lower medium and high level of need-sense indicators are formed in 101 (20%) and 108 (22%) people, respectively, the rest of the students had a low level of their formation.

Functional-competence indicators of the formation of future teachers' health-preserving competence were at low and medium levels. The low level was found by 178 people, which is 38% of the respondents in the diagnosed group, the medium – 192 (41%) of the subjects. A high level was found in 73 respondents (12%), sufficient – 43 (9%) of future teachers.

A detailed analysis of the results of the previous study shows an insufficient level (below medium or low) of the development of future teachers' health-preserving competence, which defines it as one that does not meet the requirements of today.

Taking into account the obtained data of the pilot study, we predict a significant improvement in the quality of health-preserving competence of future teachers in the context of the COVID-19 pandemic, provided that the educational

process is digitalized on the basis of SMART- and BYOD-technologies.

To determine the effectiveness of digitalization of the educational process as a means of improving the quality of future teachers' health-preserving competence in the COVID-19 pandemic and test the represented hypothesis, we conducted a pedagogical experiment involving 238 students from different pedagogical HEIs of Ukraine. During the organization of the pedagogical experiment, control and experimental groups of students were formed. In the experimental groups, the author's method of forming the health-preserving competence of future teachers in the context of the COVID-19 pandemic was implemented which is based on the assertion of UNESCO that mobile devices can contribute to the efficient use of time in the classroom and improve the quality of education (*UNESCO, 2020*) students of control groups studied according to traditional methods.

The author's method of forming future teachers' health-preserving competence in the context of the COVID-19 pandemic foresees the digitalization of educational process with the use of BYOD- and SMART-technologies.

We emphasize that the digitalization of valeducational (health-preserving) education of future teachers should be carried out in accordance with higher-level cognitive strategies that provide a creative cooperation between teacher and student, which will transform the student from the object of influence and passive participant in the educational process who accepts scientific information, often not realizing, but only memorizing it, into the subject of educational activity (the leading role in which belongs to the thought process), active (with a conscious need for scientific training and self-education) its participant, capable of logical thinking, systematization and accumulation of science knowledge, their expedient and creative use and application during decision-making in various life and professional situations.

BYOD-technology for teaching students valeducational, medical-biological and science cycles disciplines was implemented using a number of mobile applications. For example, let's mention some of them: «NeuroSlice» and «iSurf BrainView» – applications that involve the study of human brain structures based on MRI images; «Neuroanatomy – Digital Atlas» – allows to study the anatomical structures of the human brain in layers and substantiate the clinical manifestations of its various pathological conditions; «Diseases in children» – contains detailed information about children's diseases and their prevention; «Clinical Examination & Skill» – helps to develop skills in propaedeutics; «IOS» – reveals to the user olfactory and gustatory processes; «Advanced First Responder» – audio and video manuals on first aid; «Pediatric Emergencies Lite» – a program in which focuses on the problems of emergency therapy in pediatrics; as well as mobile applications that allow assessing the level of formation of students' subject competencies, namely: «Daily Anatomy: Flashcard Quizzes to Learn Anatomy» – flashcards on anatomy, which allow you to check the initial level of knowledge of students about the structure of the human body and its organs and systems; «Quiz: Anatomy» and «Easy anatomy – atlas & quizzes» – programs for intermediate control of the effectiveness of the educational process in the discipline «Anatomy and physiology of the nervous system»; «Valeology. Tests» – a program for reflection on the relevant discipline and many others.

Using the capabilities of the interactive program mozaBook as an element of SMART-technology, we are convinced that its software helps: to provide the teacher with illustrative, presentation and animated lectures; interactively perform experiments and demonstrate their results on the screen. Teacher who uses the mozaBook program has the opportunity to visualize not only lectures, seminars or practical classes, but also tools for diagnosing student achievement. For this purpose, various images, videos, audio files and 3D models can be used, which allow to analyze the results of not only theoretical but also practical preparation.

«Electronic brainstorming» method involves the use of the above SMART- and BYOD-technologies. We used it in teaching all disciplines of the valeological cycle, medical-biological and science preparation, but, for example, we will demonstrate its application in the study of «The current state of health of the population of Ukraine» in the discipline «Fundamentals of valeology and health care of children». To update the knowledge on the outlined topic, we offer students a problem to discuss «Stressful diseases of the XXI century».

Thus, the teacher from his computer using a multimedia projector highlights the problem on the interactive whiteboard for discussion (SMART-technology is used). Students, using their own mobile phones or tablets (BYOD-technology) using the WI-FI network, send to the teacher's computer their assumptions and suggestions for its solution. The teacher, without analyzing or commenting, translates them on an interactive whiteboard (SMART-technology).

When the teacher has finished covering all the assumptions made about solving the problem on the interactive whiteboard, all participants in the educational process participate in their discussion, systematization and grouping by similarity, analysis of critical remarks on each idea and, finally, choose those that do not were rejected.

We see the advantages of electronic brainstorming over verbal in saving time (no need to spend time writing ideas on the board) and reducing the level of anxiety, fear of students to evaluate their assumptions (the author of the idea is not mentioned on the interactive whiteboard).

The disadvantages of the «electronic brainstorming» method include the inability to avoid duplication of proposed solutions, but this issue is easy to solve when analyzing and grouping them by similarity.

The results of future teachers' health-preserving competence formation in higher education institutions were also monitored using SMART- and BYOD-technologies.

Quality control of future teacher's formation health-preserving competence should focus not only on testing the knowledge gained by student of resulting valeological, medical-biological, science and professional training in higher education institutions and the ability to apply the knowledge gained in life, education or future professional activities, but also to identify future teacher's emotionally-valuable attitude to valeological (health-preserving) education, the degree of their creative activity and persistence in the process of organizing and implementing of valeological (health-preserving) self-education; to promote the subject-subject (teacher-student) management of the process of of valeological (health-preserving)

education in higher education institutions, and if necessary, timely adjustment of its content, forms, methods and means of implementation; to guarantee the quality and development of valeological (health-preserving) education of future teacher's in higher education institutions and to be carried out with the use of innovative methods.

To determine the levels of future teachers' health-preserving competence and the dynamics of their changes as a separate needs-semantic, cognitive-intellectual, functional-competence, personality-regulatory and reflexive-analytical criteria and its overall indicator (according to all criteria at the same time) the computer program «BSSL: pedagogical diagnostics of formation of future teachers' readiness for health-forming activity» is developed.

To work with a computer program you need to have:

- a) technical support: processor 700 MHz and more; video adapter with a capacity of 32 MB; 50 MB of free space on the hard drive;
- b) software: any Windows operating system.

To run the program on your computer, you should run the file «BSSL.exe» from a flash drive or hard drive. The program is designed for testing groups of students up to 120 people.

The program consists of several survey blocks:

- Diagnosis of the level of need to achieve the goal;
- Diagnosis of the orientation of educational motivation;
- Test tasks of cognitive-intellectual criterion;
- Diagnostic card of functional-competence criterion;
- Measuring the level of emotionality;
- Self-assessment of willpower;
- Measuring the level of reflexivity.

Immediately after launching the program, its main window opens, which displays the name of the program and the names of its authors.

By pressing the «Continue» button, we go to the next window, which is called «Registration of the test participant». In the appropriate fields of the open window, the student should indicate his/her last name, first name and patronymic, and determine the stage of testing («Start of experiment» or «End of experiment»). After entering all the data, you must press the «Continue» button again.

The program checks the presence of a registered student in the experimental or control groups. If a student violates the registration rules, a window will appear on the computer screen warning that such a student is not found in any group. By clicking «OK», we will return to the step «Registration of the test participant» and will be able to verify the correctness of the entered data.

If the program data provided by the student was entered correctly, the program will proceed to the next step, and the window «Select the survey unit» will appear on the computer screen, in which the student will choose, in random order, one of the seven proposed tests.

When all the steps have been successfully completed and the survey unit is selected, press the «Continue» button again and the program proceeds to the next step. The selected test window appears on the computer screen. A question

automatically appears in the upper field of the survey window, and in the lower field, in the «Answer» field, there are possible options for answering it. The student needs to choose the answer that he thinks is correct and press the «Continue» key.

The algorithm of the program is composed in such a way that all the student's answers to each test are recorded and automatically included in a special BSSL.xlsx file, and, if necessary, stored in it for a period of time determined by the teacher. The program also provides for the formation of a common BSSL.xlsx file, which accumulates students' answers to all tests passed. Due to the presence of such a file, the teacher can view the test results of the selected group of students at any time.

After answering the last question of the selected test, the program calculates the total number of points scored by the student and according to them determines the level of health competence according to the selected criterion or one of the methods.

To perform the next test, the student must press the «Back to the selection of survey blocks» key. The «Select a survey unit» window will reappear on the computer screen, where the tests that have already been completed and are not available for further selection by the student will be highlighted in gray. Tests that need to be performed are highlighted in black. The student selects any test from a list of failed tests and the cycle repeats.

The program also provides the ability to interrupt testing at any stage. There are two ways to do this: if a student has completed testing on the selected test but has not passed all the tests provided by the program and wants to complete the program, he must press the «Finish» button, if testing on the selected student test not completed, but the student wants to complete the program you need to press the close window (cross in the upper right corner of the window). After doing so, a warning window will appear on your computer screen.

If you confirm your intention (pressing the «Yes» key), the program will be closed. Please note that premature termination of testing (failure to perform all tests) does not involve the calculation of the overall test result for a given student.

After the student completes all the tests in the «Result» window, the «Back to the selection of survey blocks» key is replaced by the «View the total result» key. When you click on it, another window of the program will appear, entitled «Overall test result».

The expediency and efficiency of using the described technologies (digitalization of the educational process) as a means of improving the quality of future teachers' health competence in the COVID-19 pandemic was determined by the dynamics of health competence levels of students in the control and experimental groups.

To determine the reliability of the experimental results and compare the control and experimental groups, the hypothesis was formulated: H_0 – the discrepancy between the obtained data in control groups and experimental groups is not significant; H_1 , – the discrepancy between the obtained data in control groups and experimental groups is significant, and it was found that within the study $\chi^2_{cr.} = 5.99$; $\alpha = 0.05$ (table 2).

Based on this and the relevant calculations, we state that at the beginning of the experiment on the need-sense criterion $\chi^2_{emp.} = 0,29$, cognitive-intellectual – $\chi^2_{emp.} = 0,01$, functional-competence – $\chi^2_{emp.} = 0,25$ personal-regulatory – $\chi^2_{emp.} = 0,08$, reflexive-analytical – $\chi^2_{emp.} = 0,04$ which confirms the hypothesis H_0 ($\chi^2_{cr.} > \chi_{emp.}$), and therefore indicates the homogeneity of the control and experimental groups.

Analysis of the results of the study at the end of the experiment suggests that the students of the control group the state of health-preserving competence formation in need-sense, cognitive-intellectual, functional-competence, personality-regulatory and reflexive-analytical criteria has a slight positive dynamics ($\chi^2_{emp. n-s} = 5,21$; $\chi^2_{emp. c-i} = 4,37$; $\chi^2_{emp. f-c} = 3,29$; $\chi^2_{emp. p-r} = 5,11$; $\chi^2_{emp. r-a} = 4,51$),: that is, subject to the hypothesis H_0 , and the students of the experimental group, according to all these criteria, there is a significant positive dynamics in the results of the studied phenomenon: $\chi^2_{emp. n-s} = 25,32$; $\chi^2_{emp. c-i} = 20,55$; $\chi^2_{emp. f-c} = 23,32$; $\chi^2_{emp. p-r} = 23,40$; $\chi^2_{emp. r-a} = 22,74$, which confirms the hypothesis H_1 : the discrepancy of the obtained data in experimental groups before and after the formative stage of the pedagogical experiment is significant.

Table 2

Dynamics of homogeneity of samples and reliability of results of pedagogical experiment concerning formation of future teachers' health-preserving competence

Criteria for future teachers' health-preserving competence	χ^2 before the beginning of the experiment	χ^2 after the end of the experiment		
	$E_{st}-K_{st}$	$K_{st}-K_{fin}$	$E_{st}-E_{fin}$	$E_{fin}-K_{fin}$
Need-sense	0,29	5,21	25,32	7,89
Cognitive-intellectual	0,01	4,37	20,55	7,27
Functional-competence	0,25	3,29	23,32	8,44
Personal-regulatory	0,08	5,11	23,40	9,29
Reflexive-analytical	0,04	4,51	22,74	7,66

A comparative analysis of the control and experimental groups at three levels according to Pearson's test, which was carried out at the end of the formative experiment, also shows a statistically significant difference (in favor of experimental groups) between these samples for all criteria. $\chi^2_{emp. n-s} = 7,89$; $\chi^2_{emp. c-i} = 7,27$; $\chi^2_{emp. f-c} = 8,44$; $\chi^2_{emp. p-r} = 9,29$; $\chi^2_{emp. r-a} = 7,66$ (hypothesis H_1).

Dynamics of levels formation of future teachers' health-preserving competence

Levels/ parameters	Control group		Experimental group		χ^2 , E _{st} -K _{st}	χ^2 , E _{fin} -K _{fin}
	Beginning of the experiment	End of experiment	Beginning of the experiment	End of experiment		
	%		%			
High	6,59	10,99	9,41	23,53	0,65*	8,28*
Sufficient	65,93	74,73	61,18	71,76		
Insufficient	27,47	14,29	29,41	4,71		
K _{st} -K _{fin} / E _{st} -E _{fin}	$\chi^2_{emp.} = 5,51$		$\chi^2_{emp.} = 21,29^*$			

Note* the values are significantly different $\chi^2_{cr.} = 5,99; \alpha=0,05$

It was found that after the formative pedagogical experiment, a high level of health-preserving competence was demonstrated by 10,99 % of control groups students and 25,53 % of experimental groups (increase, compared to the results before the formative experiment is 4,40 % in control groups and 14,12 % in experimental groups); a sufficient level was demonstrated by 74,73 % of future control groups teachers and 71,76 % of experimental groups (an increase in indicators is observed in control groups by 8,79 %, and in experimental groups by 10,59 %). The number of future teachers with an insufficient level of formation of the corresponding competence decreased, in control groups it was found in 14,29 %, and in experimental groups – 4,71 % (positivity of dynamics is 13,19 % in control groups and 24,71 % in experimental groups) (table 3).

Conclusion from the study and prospects for further research in this direction. The results of the pedagogical experiment confirmed the expediency and effectiveness of digitalization of the educational process as a means of improving the quality of future teachers' health competence in the context of the COVID-19 pandemic with 95% reliability.

The presented study involves the study of the experience of higher education institutions in developed countries to create educational and methodological support for the process of forming the health competence of future teachers in a pandemic COVID-19.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

1. Білик В. Г. Використання комп'ютерної програми в ході вимірювання рівнів сформованості природничо-наукової компетентності майбутніх психологів у закладах вищої освіти. *Вісник Національного університету «Чернігівський колегіум» імені Т. Г. Шевченка. Серія : Педагогічні науки.* 2020. Вип. 9 (165). С. 24-30.
2. Білик В. Г. Про педагогічний моніторинг рівнів сформованості готовності майбутніх учителів до здоров'яформувальної діяльності в початковій школі. *Педагогічні науки : теорія, історія, інноваційні технології.* 2015. № 10 (54). С. 10-17.
3. Білик В. Г. SMART-технології як засіб осучаснення природничо-наукової підготовки майбутніх психологів у закладах вищої освіти України. *Наукові записки*

Тернопільського національного педагогічного університету імені Володимира Гнатюка. Серія : педагогіка. 2020. № 2. С. 19-26.

4. Білявська Ю. В. Технологія BYOD, як інструмент SMART освіти. *Smart-освіта: ресурси та перспективи* : матеріали III Міжнар. наук.-метод. конф. (Київ, 7 грудня 2018 р.). Київ, 2018. С.12-14.

5. Вембер В. П. Впровадження технології BYOD для формувального оцінювання. *Інноваційні технології в освіті*: збірник матеріалів Міжнар. науково-технічної конф. (Івано-Франківськ, 9-11 квітня 2019 р.). Івано-Франківськ, 2019. С. 45-47.

6. Губрій Н. М., Побірска І. В. Від SMART-технологій до SMART-освіти. *Smart-освіта: ресурси та перспективи* : тези доповідей Міжнар. наук.-метод. конф. (Київ, 16-17 жовтня 2014 р.). Київ, 2014. С. 40-42.

7. Жерновникова О. А. Діджиталізація в освіті. *Психолого-педагогічні проблеми вищої і середньої освіти в умовах сучасних викликів: теорія і практика*: матеріали III Міжнародної науково-практичної конференції (Харків, 10 квітня 2018 р.). Харків, 2018. С. 88-90.

8. Литвинов О. М. Діджиталізація: на порозі цифрового дахау. *Держава і злочинність. Нові виклики в епоху постмодерну* : зб. тез доп. наук.-практ. конф (Харків, 23 квітня 2020 р.). Харків, 2020. С. 170-172.

9. Рекомендації ЮНЕСКО по політике в області мобільного обучения. *Інститут ЮНЕСКО по інформаційним технологіям в освіті* : веб сайт. URL: <https://iite.unesco.org/ru/> (дата звернення: 07.10.2021).

10. Чумак Л. В. Методологічні аспекти діджиталізації в закладах післядипломної педагогічної освіти: закономірності та наукові підходи. *Педагогічний альманах*. 2021. Випуск 48. С. 97-105.

11. Bilyk V. Natural Science and Research Training of Future Psychologists for Health-Promoting Activities. *Revista Romaneasca pentru Educatie Multidimensionala*. 2020. Vol. 12. № 2. P. 01-17.

REFERENCES

1. Bilyk, V. H. (2020). Vykorystannya komp'yuternoyi prohramy v khodi vymiryuvannya rivniv sformovanosti pryrodnycho-naukovoyi kompetentnosti maybutnikh psykhologiv u zakladakh vyshchoyi osvity. *Visnyk Natsional'noho universytetu «Chernihiv's'kyu kolehium» imeni T. H. Shevchenka. Seriya : Pedagogichni nauky*, 9 (165), 24-30. [in Ukrainian].

2. Bilyk, V. H. (2015). Pro pedagogichnyy monitorynh rivniv sformovanosti hotovnosti maybutnikh uchyteliv do zdorov'yaformoval'noyi diyal'nosti v pochatkoviy shkoli. *Pedagogichni nauky : teoriya, istoriya, innovatsiyini tekhnolohiyi*, 10 (54), 10-17. [in Ukrainian].

3. Bilyk, V. H. (2020). SMART-tekhnolohiyi yak zasib osuchasnennya pryrodnycho-naukovoyi pidhotovky maybutnikh psykhologiv u zakladakh vyshchoyi osvity Ukrayiny. *Naukovi zapysky Ternopil's'koho natsional'noho pedagogichnoho universytetu imeni Volodymyra Hnatyuka. Seriya : pedagogika*, 2,19-26. [in Ukrainian].

4. Bilyavs'ka, YU. V. (2018). Tekhnolohiya BYOD, yak instrument SMART osvity. *Smart-osvita: resursy ta perspektyvy* : materialy III Mizhnar. nauk.-metod. konf. (Kyiv, 7 hrudnya 2018 r.). Kyiv, 12-14. [in Ukrainian].

5. Vember, V. P. (2018). Vprovadzhennya tekhnolohiyi BYOD dlya formoval'noho otsinyuvannya. *Innovatsiyini tekhnolohiyi v osviti*: zbirnyk materialiv Mizhnar. naukovotekhnichnoyi konf. (Ivano-Frankivs'k, 9-11 kvitnya 2019 r.). Ivano-Frankivs'k, 45-47. [in Ukrainian].

6. Hubriy, N. M., Pobirs'ka, I. V. (2014). Vid SMART-tekhnolohiy do SMART-osvity. *Smart-osvita: resursy ta perspektyvy* : tezy dopovidey Mizhnar. nauk.-metod. konf. (Kyiv, 16-17 zhovtnya 2014 r.). Kyiv, 40-42. [in Ukrainian].

7. Zhernovnykova, O. A. (2018). Didzhytalizatsiya v osviti. *Psykhologo-pedagogichni problemy vyshchoyi i seredn'oyi osvity v umovakh suchasnykh vyklykiv: teoriya i praktyka*:

materialy III Mizhnarodnoyi naukovo-praktychnoyi konferentsiyi (Kharkiv, 10 kvitnya 2018 r.). Kharkiv, 88-90. [in Ukrainian].

8. Lytvynov, O. M. (2020). Didzhytalizatsiya: na porozi tsyfrovoho dakhau. *Derzhava i zlochynnist'. Novi vyklyky v epokhu postmodernu* : zb. tez dop. nauk.-prakt. konf (Kharkiv, 23 kvitnya 2020 r.). Kharkiv, 170-172. [in Ukrainian].

9. Rekomendatsii YUNESKO po politike v oblasti mobil'nogo obucheniya. *Institut YUNESKO po informatsionnym tekhnologiyam v obrazovanii* : veb sayt. URL: <https://iite.unesco.org/ru/>(data zvernennya: 07.10.2021).

10. Chumak, L. V. (2021). Metodolohichni aspekty didzhytalizatsiyi v zakladakh pislyadyplomnoyi pedahohichnoyi osvity: zakonmirnosti ta naukovy pidkhody. *Pedahohichnyy al'manakh*, 48, 97-105. [in Ukrainian].

11. Bilyk, V. (2020). Natural Science and Research Training of Future Psychologists for Health-Promoting Activities. *Revista Romaneasca pentru Educatie Multidimensionala*, 12, 2, 01-17. [in Ukrainian].