

Designing Cloud-oriented University Environment in Teacher Training of Future Physical Education Teachers

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Abstract:

One of the most promising means of creating and updating the database of educational and methodological materials are assumed to be cloud technologies (CT). The prospects of cloud technologies have made it possible to assume that, unlike traditional, educational and methodological support developed in the context of cloud technologies, it is open and dynamic, elementarily interchangeable and responsive to a wide range of teachers with different levels of IT competence. Theoretical and methodical principles of pedagogical training of teachers in the conditions of informational and educational environment of a HEI are substantiated: availability of interrelated IT tools system, software tools of cloud services intended to provide openness and accessibility of the selection and modification of teaching aids, organization of interactive training; diagnostic and control of the training at all stages with the aim of possible adjustment of it (application of a person-oriented approach), feedback; multilevel and differentiated approaches in training with the possibility of continuous on-line and off-line assistance; flexibility of training organization. The research aims substantiate theoretical and methodical principles of professional training of physical education teachers under the conditions the university's informational and educational environment. **Methods:** retrospection, comparison, content analysis; synthesis, generalization, theoretical design; psychopedagogical observation, conversations, testing, questionnaires, interviews; pedagogical experiment with qualitative and quantitative analysis of results, their statistical processing (A chi-squared test or χ^2 test, Microsoft Excel, σ^2 dispersion, Student's t-test, the Pearson correlation coefficient). **Participants:** 642 students were divided into three groups: two control groups (CG1 – 210, CG2 – 215) and one experimental group (EG – 217). **Results:** the values of the observed statistics χ_{13}^2 and χ_{23}^2 are respectively 8.45 and 10.08, gives grounds for rejecting the null hypothesis and acceptance of an alternative hypothesis. **Conclusions:** The experimental checkup indicates the effectiveness of the developed model, which was used by students of experimental groups since it made it possible to improve the quality of students' pedagogical knowledge, form independent work skills and increase the level of professional motivation.

Keywords: e-library, e-account, e-room, e-communication, parent-teacher e-meetings

Introduction

The purpose of the research is to substantiate theoretical and methodological foundations of pedagogical training of physical education teachers in the conditions of informational and educational environment of a university. The priority direction of the development of education is the introduction of information technologies (IT), which facilitates access to education, improving the efficiency of education and educational process in general. The problem of teachers' training in higher education institutions and, consequently, the

formation of their professional qualities in the process of learning becomes a significant factor. At the current state of development of the national system of pedagogical education, requirements for their practical and theoretical pedagogical readiness are increasing. The need for new teachers with a holistic vision of professional activity who are capable of independent decision-making and possessing special skills and abilities of interaction and communication, formed during the process of pedagogical preparation in higher education institutions is being formed. The effectiveness of the education process depends to a large extent on the teacher's personality, the level of formation of his/her readiness for a permanent process of modernization of the education system. The teacher must be characterized not only by a high level of subject knowledge, but also by the profound ability to use innovative means and forms in the professional activity – the readiness to apply the acquired knowledge and skills in educational, social, pedagogical, scientific, methodological and organizational-management activities.

Modern pedagogical education develops through the formation of a holistic view of the teacher about his own professional activity in the conditions of informatization, which is why during the past years the integrated courses of pedagogical disciplines with IT have been included in syllabi in many universities in Ukraine. On the basis of this purpose the formation of professionally important qualities of future teachers, professional consciousness and behaviour, as well as positive impact on the development of a personality is carried out. Taking into account the above, there is a contradiction between the requirements put forward by the informational society towards physical education teachers and the quality of his/her pedagogical training in higher education institutions, which is measured by the professional readiness. The research of these inquiries substantiates the need for scientifically grounded changes in the strategy and structure of their pedagogical training, in particular the search for new content, innovative methods, forms and teaching technologies using IT. This direction is of interest to R. Hurevych (2008; 2009; 2010; 2012), L. Kartashov (2010), A. Kolomiets (2008), N. Morze (2008; 2010), E. Patarakin (2007), M. Zhaldak (2010; 2011) et al.

Material&methods

The formative experiment was conducted at Ivan Ohiienko Kamianets-Podilskyi National University, Mykhailo Kotsiubynskyi Vinnytsia State Pedagogical University, Vinnytsia National Agrarian University, Communal Higher Education Institution “Kherson Academy of Continuing Education” of Kherson Regional Council, Lviv State University of Physical Culture, Olexander Dovzhenko Hlukhiv National Pedagogical University, Vasyl Stus Donetsk National University, National Metallurgical Academy, Zakarpattia Institute for Postgraduate Teacher Training, Kherson State University, Mariupol State University, Vinnytsia Cooperative Institute.

All students – 642 people – were divided into three groups: two control (CG1, CG2) and one experimental (EG). In the first control group – 210 persons (CG1) – training was carried out according to traditional approaches, that is, training was conducted in lecture rooms and computer classes of higher educational establishments. Since not all students had the opportunity to work on computers and use gadgets, they were given an additional opportunity to work in computer classes. Students of the second control group – 215 persons (CG2) – underwent on-line form of training with the elements of distance one, the essence of which was the presentation of educational information in electronic form.

Students had the opportunity to work in a developed design of cloud-oriented environment at any time. To a certain extent, the CG control group is also an experimental group when comparing groups CG1 and CG2, but the research logic requires that it should be included in the control one, since it was more important for us to compare it with the experimental group, where the developed system of teacher training system was fully utilized in the informational environment – the educational environment of the university, which envisioned the use of all systematic opportunities provided by cloud-oriented environment, namely: the availability of teaching and methodical complex (TMC) 24/7, regardless of the location of the subjects of the education process; managing the education process in the same mode; availability of teacher's recommendations and instructions off-line; ability to create personal cloud storage of training materials and e-portfolio management.

The third group – the experimental group – 217 people (EG); pedagogical training of students entering it took place under the author's system in the conditions of informational and educational environment of the university. During the formation of these groups, the lack of significant differences in the level of previous knowledge and skills formation was checked. In the general group I, the group CG1 included 107 students, the second control group CG2 – 103 people. Experimental group (EG) included 111 people.

Students of the general group II were divided in the same way into 3 groups: two control (CG1, CG2) and one experimental (EG). Thus, the group CG1 included 98 students, the second control group CG2 – 117 students and the experimental group – 106 students. To exclude the subjective influence of the experimenter and to create the same conditions for all participants of the experiment, the following measures were proposed and used: all experimental activities were carried out by teachers who received clear instructions on the procedure and conditions for conducting the experiment; students who participated in the experiment also received single clear instructions; the use of computer technology was organized in such a way as to disable the teacher's

influence on the course of the experiment, and with the help of the calculation automation to objectively evaluate the results of the experiment.

In accordance with the goals, the following methods were used at various stages of the research: theoretical methods: retrospection, comparison, logical analysis of philosophical, psychopedagogical and methodical sources, dissertations – to specify the condition and prospects of the research problem; synthesis, generalization, theoretical design – to reveal the essence of the problem, to outline the basic concept and terminology, to justify a structural and functional model of experimental training, to distinguish the main components of future teachers' professional training to implement educational technologies in physical education, to characterize technological competency in the general structure of professional competency; empirical methods: diagnostic methods (psychopedagogical observation, conversations, testing, questionnaires, interviews); pedagogical experiment with qualitative and quantitative analysis of results, their statistical processing; personal pedagogical scientific and practical experience, which made it possible to introduce a system of training future physical education teachers to implement educational technologies into the real education process in higher education institutions and verify its effectiveness at various educational and qualification levels.

To test the fact that the groups under consideration do not differ significantly among themselves, a χ^2 test was used. Additionally, using the spreadsheet data processing package Microsoft Excel, dispersion was calculated σ^2 samples and values of Student's T-criterion for $\alpha=0,05$. With the help of this method the hypothesis about the proximity of mathematical expectations for the samples was tested (zero hypothesis–mathematical expectations for the samples coincide, alternative–no). Pearson correlation coefficients for the pairs of samples CG1-CG2, CG1-EG, CG2-CG were also calculated.

At the stage of the confirming experiment there was collected information on the levels of the previous formation of pedagogical competence of students of experimental and control groups. Statistical testing of hypotheses allowed us to conclude that the data obtained during the experiment, in general, do not contradict the hypotheses regarding the absence of statistically significant differences in the groups according to the chosen indicator.

The students from general group No 1 studied pedagogical courses of the integrated educational and methodical complex set forth in cloud-oriented teacher training; the students from general group No 2 studied pedagogical courses according to traditional approaches.

In order to ensure equal conditions for all the students, it was taken into account that they all have minimum knowledge of working on the Internet, which is sufficient for curricular and extracurricular activities. Therefore, special training for working with computer and a network of EG students was not conducted. However, the process of training for self-study is an integral part of the developed system of using cloud-oriented environment of teacher training for physical education teachers in higher education institutions and, consequently, it was incorporated into the training content.

The education process of CG students included only lectures and practical classes (for academic groups combined in CG 1 and CG 2; the CG 2 students, including teachers, had the opportunity to use educational material in cloud storage (optional); the EG students were able to study both during scheduled classes and at a steady pace in a computer classroom connected to the local university network and the Internet.

During the experiment, the EG students had free access to this classroom as part of self-study. To ensure the purity of the experiment, the teachers communicated with them only with the help of computer. The students from the CG 2 were allowed to self-study in computer classrooms. However, they did not obtain access to learning resources in cloud storage (the access to them was authorized).

Tests papers were used to assess the development level of students' pedagogical competency after each module. The formative assessment of each module made it possible to follow the individual trajectory of training of each student from experimental groups, to study the conditions of implementing perception principles and check the level of the acquired knowledge. The results obtained from the formative assessment allowed analyzing the individual dynamics of changes in the development level of students' knowledge and skills during the training.

All the students were expected to undergo summative assessment and extended assessment (one month after the training completion). The results obtained from summative and extended assessment were processed based on the criteria developed at the start of the research and used during the confirming experiment. The presentation of some results obtained at the formative experiment in the form of four-point assessment scale rather simplified their processing and caused the need to develop a procedure for coordinating the results of the confirming and formative stages of the experiment. The students used different forms of work, including discussions (communicating with teachers and peers), independent work (performing lecture-based, practical and laboratory tasks) and searched for the necessary educational information on the Internet, etc.

Designing a cloud-oriented environment for teacher training creates effective prerequisites for the system of teacher training of physical education teachers under the conditions of the university's informational

and educational environment. The author's project of a cloud-oriented environment, which methodically interprets the main conceptual principles of teacher training of physical education teachers at university, justifies the continuity of support of such processes as acquiring professional knowledge and developing skills and abilities in modern, mobile and competitive teachers. The project aims to improve teacher training, in particular the content and organization of the education process at university.

It is recommended that courses should be mastered through SkyDrive, one of many Microsoft cloud services which provides users with a wide range of services, namely a user-friendly calendar with clear interfaces; the possibility to plan a day, week, month or create some tasks and corresponding reminders; task management; the possibility to create an address book; reminder via e-mails or texts; the possibility to perform self-study tasks or collective tasks (joint processing); access from different devices and from any place (location); security of information; the possibility to synchronize between computers or any folder on one's computer; active continuous development of SkyDrive (OneDrive) (Kartashova, 2010).

As is known, the effectiveness and level of the acquired material more depend on how well the student is prepared for such activities. Given that the material is quite extensive, future physical education teachers are offered to work with it first independently. To this end, lecturers create and post some relevant tasks in SkyDrive on the day of the planned lecture.

Before the class, students receive reminders via e-mails or texts. This approach is used by the lecturer to intensify students' educational and cognitive activities, as well as their interest in further independent study of the educational material due to active feedback. This makes it possible to motivate future teachers towards scientific thinking, autonomy and creativity. As a result, they become ready to consciously comprehend the educational material, memorize and reflect on it and, if necessary (for example, during practical lessons), reproduce it.

Future physical education teachers are also expected to perform creative tasks with the aim to consolidate theoretical material. They involve writing essays and developing organizational and pedagogical conditions for successful planning of university operation based on the recommended scientific and methodological sources on a specific topic. Therefore, students develop creative skills, and with the help of SkyDrive, they are given the opportunity to address the issues set forth in the plan of practical classes and perform creative tasks suggested by the lecturer. After performing such tasks and presenting them according to the given requirements, students send them to the lecturers via e-mails or texts.

Chat consultations assist future physical education teachers in discussing the most important, complex and interesting issues of the topic under study. For one, the lecturer plans in advance when a chat consultation takes place and determine its mode of operation (once, daily, weekly). Lecturers and students log in SkyDrive simultaneously to discuss or clarify some details of a specific issue (e.g., to consult on the preparation for an upcoming examination paper).

Independent work of students is organized on a qualitatively new level in real and virtual classrooms. Once self-study tasks have been performed, they are evaluated by the lecturer. The scale and approaches to evaluating the results of creative tasks (in practical or individual classes or during module-based test papers, final examinations, discussions during chat consultations, pass-fail exams) are reflected in methodological guidelines which students have the opportunity to familiarize themselves with before starting the course.

The next stage of work is conducted using such methods as formative assessment (module-based assessment of knowledge), general and individual questioning (during chat consultations), final test papers, pass-fail examinations. The authors of the article believe that students should be able to independently assess and analyze their knowledge. The results and evaluation stage is implemented during classes, chat classes or when evaluating students' independent work in the form of interviews, colloquia, tests, chat consultations, pass-fail examinations, defence of individual research tasks etc. Educational achievements of future physical education teachers from all planned types of performed work (theoretical training, practical work, individual research tasks, independent work, creative tasks, etc.) are evaluated in terms of quantity, that is by ranking.

An effective organizational and methodical solution by way of a systematic influence on developing professional competencies is the introduction of an optional course on *Methodology of organizing professional activities of teachers in an innovative educational environment* into the syllabus of professional training of future physical education teachers.

Some relevant tools enabling interactivity of the education process were integrated into cloud-oriented teacher training. They are the following: OneNote, an organizational unit (to create notes and organize personal information of the lecturer); Skype (to exchange documents, images via messages and demonstrate one's own screen's working area); GoogleDisk (to store images, text documents, spreadsheets, audio and video files); SkyDrive (OneDrive (Word, Excel, PowerPoint), a file repository shared with different devices; Dropbox – the integrated educational and methodical complex content for shared use; the lecturer's personal web-site; OneNote (to synchronize data across various devices).

An e-learning environment of the lecturer is an electronic educational resource, which is a virtual reproduction of a university classroom created in ACCENT, a social education network.

This e-learning environment contains the following modules: 1) technical aspects (registration, statistics) and e-library, that is a subject-specific electronic educational resource; an author's development intended for use within the limits of the current e-learning environment); e-classroom (sub-modules): work field reproduces a traditional classroom with the possibility of conducting classes in real time and in distance mode; 2) e-communication is intended for communication both in real time and in distance mode (in time and territorial terms); supervision of how classes are conducted and monitoring of attendance include keeping a record of work, a journal, etc.; 3) monitoring of higher education quality; 4) educational and methodical material contains the material distributed by the lecturer as the content of sub-modules: for students; for lecturers; 5) the calendar contains planning of classes (daily, weekly, monthly or termly) and is open to students; 6) timetable; 7) parent-teacher e-meetings are intended for communication with parents: either with an individual or with a group of parents, the parent committee; either in a hidden or open mode; either in real time or distance mode (in time and territorial terms).

The e-learning environment is intended for conducting classes by various organizational forms; solving the problem of organization and support of distance learning for those individuals living in temporarily occupied territories or far from the educational institution or having special educational needs and for educational institutions during pandemic periods or worsening epidemics; establishing relationships between the sub-systems of general, special and disciplinary levels; creating motivation factors in higher education institutions taking into account systematization in cloud storage facilities of educational and methodical complexes (in particular the above-mentioned integrated educational and methodical complex) located in the ACCENT web-library.

The personal web-site of the lecturer plays a special role in the organization and management of teacher training. Here, the lecturer can post messages, reminders and virtually hold additional organizational events that are related to teacher training and effectively contribute to professional development of future teachers. The *Forum* module is intended for joint discussions about any issues related to education, in particular professional training of future physical education teachers.

The lecturer provides access to certain educational material to both students and colleagues through Dropbox. It must be noted that users can leave their comments, suggestions and wishes on the pages of the *Guestbook* module. Registered users, including students, have the opportunity to post photo reports from their albums on the *Photo Albums* page. On the advice of the lecturer, students post photo reports and videos of teaching placements, which become educational material for joint work of lecturers and students in the future.

Results

The data obtained during the confirming experiment are inputs for the evaluation of the impact of the application of the experimental model of a teacher training system in the conditions of the IOS of the HEI on the level of formation of pedagogical competence. The results of the final control (testing and diagnostic tests), as well as the results of the delayed control, showed a significant positive impact of the developed model of the TT system of future teachers in the conditions of IOS of the HEI. The obtained results of the final control are presented in Figures 1 and 2.

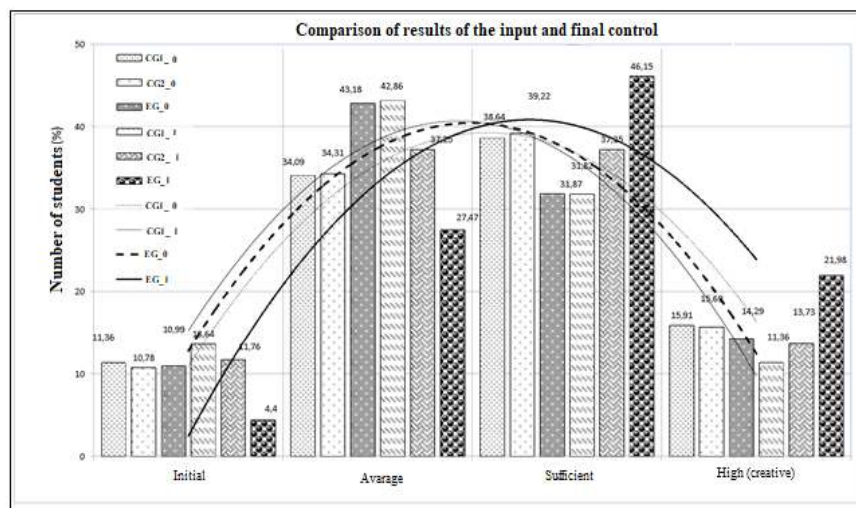


Fig. 1. Distribution of the level of pedagogical competence formation of control and experimental groups students (for EG 1)

In Fig. 1 the following marking is used: CG 1_0 – data of input control for group CG1; CG 2_0 – data of input control for group CG2; EG_0 – input control data for the EG group; CG 1_1 – data of final control for group

CG1; CG 2_1 – data of final control for group CG 2; EG_1 – data of the final control for the group EG. Trend lines (approximation distribution curves built as polynomials of the second degree using the least squares method) are constructed for data CG1_0, CG1_1 (thin lines) and EG_0, EG_1 (bold lines).

Thus, the number of EG I students in the experimental group with a high level of formation of pedagogical competence increased by almost 8%, and with sufficient – by 15%. According to the results obtained by students from the first control group, the indicator of high pedagogical competence decreased by 7%, and sufficient – by 5%, while in the second control group the number of students with high and sufficient levels decreased by almost 2%. The number of students of EG II in the experimental group with a high level of formation of pedagogical competence increased by almost 9%, and with sufficient – by 13%. Differences between the students distributions by the level of pedagogical competence are quite clearly seen in comparison of ogives distributions (trend lines) for the data of one of the CG and EG. According to the results obtained in the first control group, the indicator of high level of knowledge decreased by 1%, and sufficient – by 2%. In the second control group, the indicator of sufficient level of knowledge remained unchanged, while the high one dropped by 1%.

This is normal for the traditional organization of training in the system of higher education and such differences, as shown by the results of statistical analysis of input data, are within the measurement error. The ogives of the student distribution by success groups before and after training practically coincide. Exposition of the results of experimental training in Fig. 2 makes it possible to state that the maximum distribution of students by the learning achievement groups, as mentioned above, has essentially shifted to a high level.

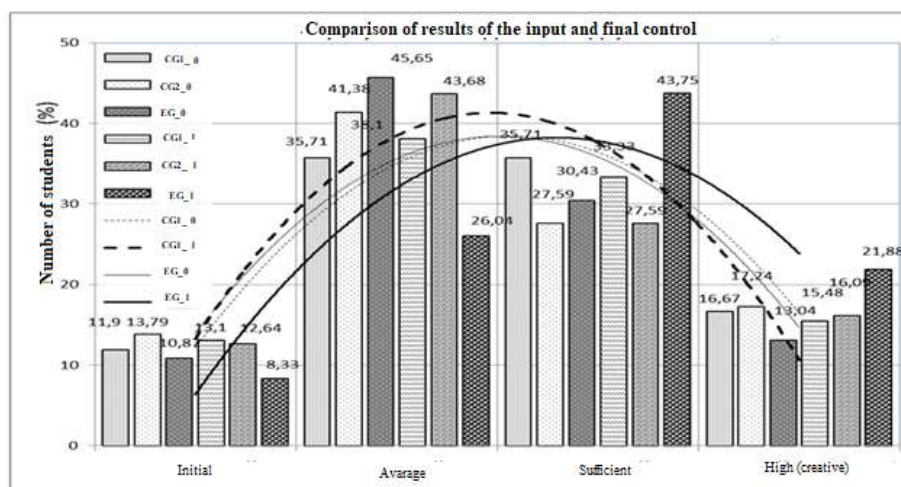


Fig. 2. Distribution of the levels of pedagogical competence formation of control and experimental groups students (for EG 2)

This is also confirmed by the results of statistical processing of data. In Fig. 2. the following marking is used: CG1_0 - data of input control for group CG1; CG 2_0 - data of input control for group CG 2; EG_0 - input control data for the EG group; CG 1_1 - data of final control for group CG1; CG 2_1 - data of final control for group CG2; EG_1 - data of the final control for the group EG. Graphically, the results of the initial, final and delayed control are shown in Fig. 3 and 4. The following criteria values were obtained for EG 1: $\chi_{12}^2=5,31$ (CG1 and CG2); $\chi_{13}^2=12,97$ (CG1 and EG); $\chi_{23}^2=9,85$ (CG2 and EG). The critical value for the three degrees of fluency at the level of significance $\alpha = 0.05$ equals 7.815.

Since the statistics value is χ_{13}^2 equals to 12,97 and χ_{23}^2 equal to 9.85, which is more than the critical value of 7,815, then according to the decision making rules, the results give grounds for the rejection of the null hypothesis and the adoption of an alternative hypothesis, according to which the application of the developed model of the system of pedagogical training of teachers in the conditions of IOS of HEI positively influences the level of formation of the pedagogical competence of students of EG; differences in the level of students' knowledge formation in EG and CG are statistically significant.

Since the value χ_{12}^2 is equal to 5.31, which is less than the critical value of 7.815, the obtained results indicate that there are no significant differences in the level of pedagogical competence of the students of the two control groups, EG I.

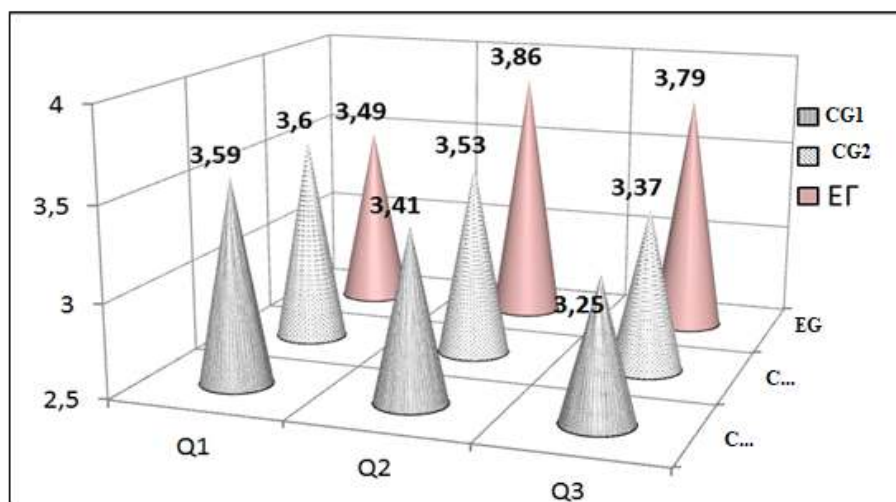


Fig. 3. Comparative diagram of results of initial, final and delayed control (EG 1)

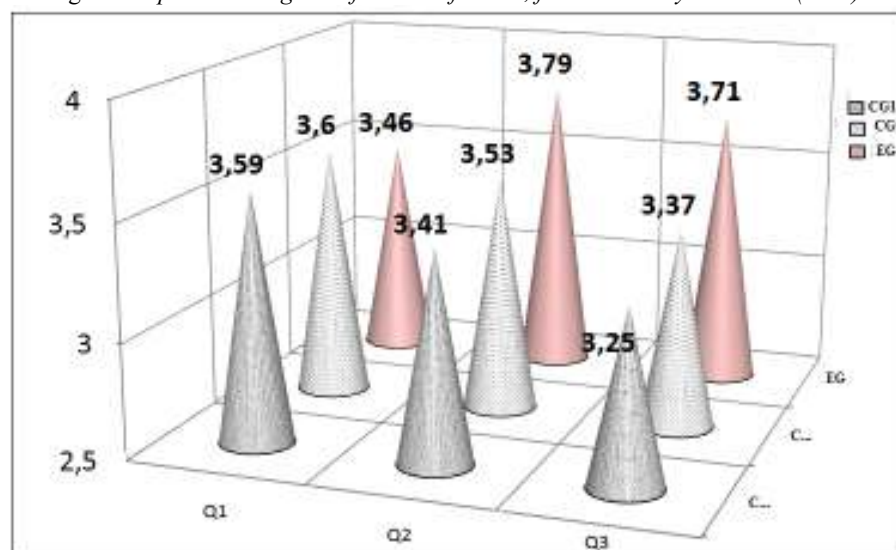


Fig. 4. Comparative chart of the results of initial, final and delayed control (EG 2)

For EG 2, the following criteria values were obtained: $\chi^2_{12}=1,02$ (CG1 та CG2); $\chi^2_{13}=8,45$ (CG 1 та EG); $\chi^2_{23}=10,8$ (CG2 та EG). Critical value for the three degrees of freedom at the level of significance $\alpha=0,05$ equals 7,815.

Since the values of the observed statistics χ^2_{13} and χ^2_{23} are respectively 8.45; 10.08; which is more of the critical value of 7,815, then according to the rules of decision-making, the results give grounds for rejecting the null hypothesis and acceptance of an alternative hypothesis, according to which the application of the developed model of the pedagogical training of teachers system in the conditions of the information-educational environment of a higher educational establishment positively affects the level of knowledge formation and skills of students of the experimental group; Differences in the level of formation of students' pedagogical competence in experimental and control groups are statistically significant. Consequently, the pedagogical experiment confirmed the hypothesis of the effectiveness of the developed pedagogical training of teachers model and in the conditions of the informational and educational environment of the HEI.

Discussion

Current students' sufficient knowledge of IT (92% of students show a high level of use) and lecturers' readiness to integrate them into the education process contribute to developing one of the components of future teachers' professional mastery, that is the capacity for self-study (Maksymchuk et al., 2018)

It must be noted that multifacetedness and multidirectionality of cloud technologies used in the author's development become the motivational factor which generates the principle of "working according to model" (Halaidiuk et al., 2018).

The diversity of IT and the “working according to model” principle intensify the process of acquiring their own pedagogical techniques, which becomes a meaningful characteristic of personal pedagogical experience of competitive specialists in the future. (Maksymchuk et al., 2018).

It must be noted that the students of the experimental group are rather interested in the learning process. Thus, the analysis of authoritative data stored in cloud-oriented environment proves that most students of experimental groups show a steady interest in learning through cloud technologies.

The Internet had, however, a negative distracting effect on learning, too. The lack of consistent work in the network for a significant number of students outside the university and the natural interest prompted to use the opportunities provided by the network not only in terms of learning. Nevertheless, 60-70% of students' requests were based on courses under study.

The students of control groups who studied with traditional textbooks and teaching aids initially also showed interest in learning, but it quickly faded. Some students copied educational material of electronic sources on flash drives showing interest primarily in the possibility to “take it home” (with the hope “to find some time to sort it out”) rather than the very educational material and learning process. As shown by the analysis of the results obtained from pedagogical observations, most students never found the time to work with the educational material.

Some students only printed out materials postponing its thorough study to the final test paper. Other students only read and looked through the text, which is usually not enough for the qualitative acquisition of educational material.

Still, the applied method of organizing learning activities did not generally reduce the indicators of the development level of students' knowledge and skills of independent work.

They spent more time performing practical tasks. Given that they did not fully master theoretical material, most of the tasks were done by trials and errors without knowing the algorithm of action and analyzing the causes of failures. Formative assessment of these students has shown a certain decrease in the level of knowledge and skills.

Therefore, the concept of building cloud-oriented teacher training based on a logical, structured and organic combination of traditional and innovative learning tools requires that one should design and develop technologies, which make it possible to update the education process, replace and / or supplement traditional methods and ineffective teaching methods and, as a result, improve learning outcomes.

The conducted research does not disclose all tasks concerning pedagogical training of teachers. An issue of application of CT at school requires further research in order to support the continuity of the educational process, in the system of postgraduate education of teachers, etc.

Conclusions

Introducing the proposed system of professional training of future physical education teachers contributes to increasing learning activity of students, enhancing objectivity of evaluation and monitoring and improving IT competence. The current research proves that cloud services such as SkyDrive (OneDrive) are effective in the activities of physical education teachers and lecturers, who integrate modern technologies in the education process.

An analysis of the current state of pedagogical training of teachers, taking into account the application of cloud technologies in HEIs, pointing out the need of finding innovative approaches to its organization and support with the purpose of: development of students' ability to independently identify and solve pedagogical problems, modeling of developing and creative situations, defining individual trajectories for the development of students - in accordance with their personal qualities, the search for innovative ways of transition from patterns and traditions to the organization of educational excellence in work; development of mechanisms of professional self-improvement, etc.

In the process of distinguishing theoretical and methodical principles of pedagogical preparation of teachers in the conditions of informational and educational environment of a higher education institution, it was found out that the result of pedagogical training depends on the organizational and pedagogical conditions of the cloud-oriented environment in teacher training, which provide the implementation of its concept, give its structure a systemic and logical character, provide the formation of knowledge, skills and competencies of a competitive teacher. Organizational-pedagogical conditions is the existence of a system of interrelated IT tools, software tools of cloud services, designed to ensure the openness and accessibility of the selection and modification of educational management tools; interactive learning organization; diagnostics and control of training at all stages with a view to its possible adjustment (application of personality-oriented approach); feedback; multilevel and differentiated approaches in training with the possibility of continuous on-line and off-line assistance; the flexibility of training organization.

The main directions and factors of the formation of the informational and educational environment of the higher education institution are: the improvement of the educational environment of the HEI and the development of an open, multidimensional dynamic real space that provides interaction and cooperation of the

subjects of the educational and disciplinary process (EDP), development of personal qualities of teachers and students in the process of resolving pedagogical issues. Cloud technologies are seen as one of the most promising means of creating and updating the training and teaching materials base. CT prospects suggest that, unlike traditional, teaching and methodological support, developed under the conditions of cloud-oriented environment of teacher training, it will be open and dynamic, elementary changeable and responsive to a wide range of teachers with different levels of IT competence.

Involvement and implementation of the cloud-oriented environment of teacher training in the IOS of higher educational establishments testify that one of the most effective forms of using IT opportunities in the pedagogical training of future teachers is the inclusion of their varieties in all types of activities of a teacher: communicational, organizational, educational and disciplinary. The didactic significance of the cloud-oriented environment of teacher training in increasing the effectiveness of teaching is dependent on logical application and determination of the place of rational approaches in choosing CT. The experimental checkup indicated the effectiveness of the developed model, which was attended by students of experimental groups, since its use made it possible to improve the quality of students' pedagogical knowledge, to form independent work skills and to increase the level of professional motivation.

References:

- Bahmat, N. V. (2015). *Organizing industrial practice in residential institutions*. Kamianets-Podilskyi: Buinytskyi O. A.
- Bahmat, N. V. (2016). *Methodology of organizing professional activity of teachers under the conditions of innovative educational environment*. Kamianets-Podilskyi: Druk-servis.
- Bykov, V. Y. (n.d.). *Technologies of cloud computing, ICT outsourcing and new functions of ICT subdivisions of educational institutions and scientific institutions*. Retrieved from http://ite.kspu.edu/webfm_send/251.
- Halaidiuk, M., Maksymchuk, B., Khurtenko, O., Zuma, I., Korytko, Z., Andrieieva, R. ... Maksymchuk, I. (2018). Teaching approaches in extracurricular physical activities for 12-14-year-old pupils under environmentally unfavourable conditions. *Journal of Physical Education and Sport*, 18 (4), 2284–2291.
- Hurevych, R. S. (2009). Information technologies of education as a result of informatization of the educational branch in pedagogical HEIs, *Vinnytsia*, 22, 3–7.
- Hurevych, R. S. (2010). Information culture of the teacher as a necessary component of modern education. *Modern information technologies and innovative methods of training in the training of specialists: methodology, theory, experience, problems*, 23, 190–195.
- Hurevych, R. S. (2012). *Informational and communicational technologies in professional education*. Vinnytsia: Planer.
- Hurevych, R.S. (2008). Shaping readiness in future teachers for professional activities in the field of information and communication technologies. *Theory and Practice of Social Systems Management: Philosophy, Psychology, Pedagogy, Sociology*, 2, 92–98.
- Kartashova, L. A. (2010). Developing IT readiness as a new qualitative characteristic of social sciences and humanities teachers. *Pedagogical Discourse*, 8, 90–97.
- Kashuba, V., Kolos, M., Rudnytskyi, O., Yaremenko, V., Shandrygos, V., Dudko, M., Andrieieva, O. (2017) Modern approaches to improving body constitution of female students within physical education classes. *Journal of Physical Education and Sport*, 17(4), 2472–2476
- Kolomiets, A. M. (2008). *Theoretical and methodological principles of shaping informational culture formation in future primary school teachers*. (Abstract of Postdoctoral Research). The Institute for Teacher Education and Adult Education, Kyiv.
- Maksymchuk, B. A., Halaidiuk, M. A., & Maksymchuk, I. A. (2018). Valeological self-development and activation of motivation in future specialists for developing valeological competency under the conditions of globalization and integration processes. In V. I. Shakhov, O. M. Palamrachuk, & V. M. Galuziak (Eds.), *Personal and professional development of future specialists in sociology under the conditions of society's transformation* (pp. 261–273). Vinnytsia: Nilan-LTD.
- Maksymchuk, B. A. (2010). Patterns and Driving Forces of Forming Future Teacher's System of Valeological Qualities. *Scientific Journal of M. P. Drahomanov National Pedagogical University. Series 15, Scientific and Pedagogical Problems of Physical Culture (Physical Culture and Sport)*, 7, 163–167.
- Maksymchuk, B. A. (2010). *Preparing future primary school teacher for physical education of pupils*. Vinnytsia: Planer.
- Maksymchuk, B. A. (2010). *Training Future Primary School Teacher for Physical Education*. Vinnytsia: Planer.
- Maksymchuk, B. A. (2011). Learning and Cognitive Activity of Students in the Context of Valeological Objectives of Teacher Education. *Modern Information Technologies and Innovative Methodologies of Learning in Training of Specialists: Methodology, Theory, Experience, Problems*, 28, 370–376.
- Maksymchuk, B. A. (2011). Students' Learning and Cognitive Activity in the Context of Valeological Objectives of Teacher Education. *Scientific Journal of M. P. Drahomanov National Pedagogical*

- University. Series 15, Scientific and Pedagogical Problems of Physical Culture (Physical Culture and Sport)*, 11, 11–14..
- Maksymchuk, B. A. (2012). Components of Future Teachers' Valeological Culture. *Modern Information Technologies and Innovative Methodologies of Learning in Training of Specialists: Methodology, Theory, Experience, Problems*, 31, 410–414.
- Maksymchuk, B. A. (2012). Levels of Future Teachers' Preparation during Forming Valeological Competency. *Modern Information Technologies and Innovative Methodologies of Learning in Training of Specialists: Methodology, Theory, Experience, Problems*, 32, 363–366.
- Maksymchuk, B. A. (2017). *Theoretical and methodical principles of developing valeological competency in future teachers during physical education*. (Postdoctoral Research). Mykhailo Kotsiubynskiy Vinnytsia State Pedagogical University, Vinnytsia.
- Maksymchuk, B. A., & Shestopaliuk, O. V. (2009). *Professional training of future teacher: physical education, sport, health*. Vinnytsia: Planer.
- Maksymchuk, B. A. (2009). Trends and prospects of Professional Training for Future Teacher in the Context of Valeological Approach. *Relevant Problems of Physical Education and Methodologies of Sport Training*, 65–69.
- Maksymchuk, B. A. (2011). Communication in the Structure of Valeological and Pedagogical Activity. *Scientific Notes of Mykhailo Kotsiubynskiy Vinnytsia State Pedagogical University. Series: Pedagogy and Psychology*, 35, 254–258.
- Maksymchuk, I., Maksymchuk, B., Frytsiuk, V., Matviichuk, T., Demchenko, I., Babii, I. ... Savchuk, I. (2018). Developing pedagogical mastery of future physical education teachers in higher education institutions. *Journal of Physical Education and Sport*, 18 (2), 810–815.
- Melnyk, N., Bidiuk, N., Kalenskiy, A., Maksymchuk, B., Bakhmat, N., Matvienko, O. ... Maksymchuk, I. (2019). Models and organizational characteristics of preschool teachers' professional training in some EU countries and Ukraine. *Збірник Інститута за педагогіка істраживања*, 51 (1), 46–93.
- Morze, N. V. (2008). *The principles of information and communication technologies*. Kyiv: BHV.
- Morze, N. V. (2010). *Institutional repository of modern university and ways of realizing open access initiative*. Proceedings of the 2nd International forum on "Problems of Information Society Development". Kyiv: The Ukrainian Institute for Scientific and Technical Expertise and Information.
- Morze, N. V., & Kuzminsla, O. H. (2010). Creating a university's e-library in the environment of EPrints. *Scientific Journal of M. P. Dragomanov National Pedagogical University: Series 2: Computer-Based Learning Systems*, 8 (15), 119–125.
- Morze, N. V., & Kuzminsla, O. H. (2012). Cloud computing in education: experience and prospects of implementation. *Information Science and Information Technologies in Educational Institutions*, 1 (37), 109–115.
- Morze, N. V., & Vember, V. P. (2007). How to determine a pedagogical value of electronic teaching aids? *School, Lyceum, Gymnasium Principal*, 4, 31–36.
- Patarakin, E. D. (2007). *Creating pupil, student and teaching societies based on network services of Web 2.0*. Kyiv: Educational and Methodological Center "Consortium for the Improvement of Management Education in Ukraine".
- Shakhov, V. I., Palamrachuk, O. M., & Haluziak, V. M. (2018). *Personal and professional development of future specialists in sociology under the conditions of society's transformation*. Vinnytsia: Nilan-LTD.
- Sybil, M., Pervachuk, R., Zahura, F., Shandrygos, V., Yaremenko, V., Bodnar, I. (2018). Biochemical changes in cluster analysis indicators as a result of special tests of freestyle wrestlers of lactate and lactate types of power supply. *Journal of Physical Education and Sport*, 18(1), 235–238.
- Zhdalak, M. I. (2011). The use of a computer in the education process should be pedagogically balanced and appropriate. *Computer in School and Family*, 3, 3–12.
- Zhdalak, M. I. (2010). Teacher training system before the use of information and communication technologies in the education process. *Information science and information technologies in an educational institution*, 4–5, 76–82.