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MODELING THE DIGITAL LEARNING ENVIRONMENT FOR PRIMARY SCHOOL TEACHER TRAINING

Abstract. Over the past few years the processes of education informatization are tied with its digitalisation. The certain upgrades of electronic educational resources take place and the new era of learning tools – digital learning resources – is developing. The preference is given to the open educational resources that can work on any digital device, so they are digital educational resources. The article presents the experience of using the distance course "Digital Technologies for Teaching and Research" for primary school teacher training at State Higher Education Institution "Donbas State Pedagogical University". The analysis of the practical use of the distance course and studying foreign scientific and methodological data sources proves the necessity of forming and developing the Next Generation of Digital Learning Environment (NGDLE).
Five main functional domains of NGDLE are distinguished and analysed which ensure its full implementation: interoperability and integration; personalization; analytics, advising, and learning assessment; collaboration; accessibility and universal design. The model of digital learning environment for primary school teacher training is completely intuitive platform for integrating the virtual training of primary school teachers, conducting conferences and webinars, effective collaboration of scientists, university lecturers, university students and school teachers. The platform clusters are characterized (distance courses, digital teaching and learning resources, internet conferences, webinars, student and teacher e-portfolios, forum) which correlate with mentioned features of the Next Generation of Digital Learning Environment. It is proved that the Next Generation of Digital Learning Environment is developed due to evolving traditional learning management systems (LMS) and their similarity with the principles of open education and flexible personal learning environments.

Keywords: digital learning environment; learning management system; distance course; model; primary school teacher training.

1. INTRODUCTION

The trends of digitalisation that take place at all the stages of education and in different spheres of modern information society require the higher education institutions to train the specialists who can compete at the labour market, as well as they should be able to study lifelong. The university graduates should adapt to the new changes in science and the sphere of their professional activities. They must be digitally literate. The development of digital

literacy and digital competency are the concepts that have been introduced into the educational areas of humanities. Moreover, the scientists assert that new educational resources should be designed, using ICT and being accessible for students. These regulations correspond to the principles of open education. Providing the students with open education, an equal access to all the learning resources, organizing the efficient electronic communication and collaboration are aimed at meeting the requirement of information society. The national and foreign educators argue about developing the learning environment for future specialists' training which contributes to developing the features of openness, increasing the innovativeness, effectiveness and productivity of modern education system.

Problem setting in general. The problem of designing the digital learning content is relevant as it's one of the trends of digitalisation of both national and foreign pedagogy which are proved by a number of documents. They are: Digital Agenda for Europe; Europe 2020 Strategy for Smart, Sustainable and Inclusive Growth; Digital Agenda of Ukraine – 2020; Law on Education; Concept "New Ukrainian School"; Strategy of Developing the Information Society in Ukraine etc. [1; 2]. Designing and creating new learning tools are the urgent necessity for professional training of the specialists in different spheres. Virtual learning environment Moodle is the most popular platform among the university lecturers for collaborating and communicating with students, but it has a number of deficiencies that restrict the opportunity of implementing the principles of open education. Firstly, the platform limits the access to the courses. Secondly, the platform doesn't allow to upload files that are more than 20 Mb. Thirdly, the interface for conducting interaction between the course participants is thought to be not very customer friendly. The iconography for identifying the options and access to the resources is absent, the menus are not intuitive, as well as the layouts are designed as normal blogs. So the initiative group of the scientists who work at the Department of Primary Education Theory and Practice at SHEI "Donbas State Pedagogical University" have decided to design the educational digital environment for teaching and research which is completely intuitive educational platform where virtual training of future primary school teachers is organized, as well as conferences and webinars are held, the efficient collaboration between scientists, lecturers, university students and school teachers take place.

Analysis of recent research and publications. The urgent need of developing the learning environment is proved by a number of documents issued by European Commission, agendas of international and national organizations. The main guidelines of Digital Agenda for Europe are the enhancement of digital literacy and skills and the accessibility of digital educational services. Following these guidelines, Ukraine focuses on the key regulations of digital society development. As a result, the Project "Digital Agenda of Ukraine – 2020" has been developed [1]. Also, Strategy of Education Development in Ukraine for 2012-2021 and Law of Ukraine on Higher Education emphasize the improvement of information support, structure and content of education through its informatization and digitalization [2].

The Ministry of Education and Science of Ukraine initiates the designing and development of a single platform for national system of education where open electronic educational resources (textbooks, tutorials etc.) and digital learning tools could be located. In the Regulations on National Educational Electronic Platform, it is noted that an open access to the e-textbooks for all the participants of educational process should be provided for increasing the quality of national system of education, as well as for building the market of qualitative learning products and services.

The aim of most of the digital education policy initiatives in Europe is to develop infrastructure and teaching capacity as well as the promotion of the use of digital resources. According to Science for Policy report given by the Joint Research Centre (JRC), the European Commission's science and knowledge service, the priority aspects of digital

education are thought to be the implementing mobile learning, using virtual learning environments, platforms, applications and tools. For ensuring the high quality of the higher education and teacher training, designing of online training courses, in particular massive online open courses are reported to be of great importance [1].

The development of distance education and technology of designing distance courses is studied by A. Avramchuk, L. Havrilova, V. Kukharenko, and I. Kovalynska [3; 4; 5]. The problem of development of the digital pedagogy that includes such issues as modeling and designing educational and scientific environment of tertiary institutions is revealed in the works of V. Bykov, O. Buinytska, A. Hurzhii, V. Kremen, S. Lytvynova, A. Manako, N. Morze, L. Panchenko, and M. Shyshkina [6].

Ukrainian scientists O. Hlazunova, O. Kolhatin, and L. Panchenko study the methodology of implementing information and communication technologies into the learning environments of universities. The researches are devoted to different aspects of the development of learning environment: designing of the cloud-based learning and scientific environment (M. Shyshkina, M. Popel); cloud-technology as a learning tool (O. Markova, S. Semerikov); developing of the hybrid cloud-based learning environment for forming self-educational competencies (T. Voloshyna); developing of the information learning environment of the tertiary institution (S Atanasian, I. Zakhsrova, K. Krechetnikov, O. Sokolova).

Special attention is paid to the development of online courses among the foreign scientists: C. Permalla, J. Mak, N. Kee, and S. Maththews [7] conducted the case research in which the development of the distance learning environment is described through implementing web applications into online courses; M. Cinar and N. Torenli propose the ways of redesigning the online courses for meeting the requirements of new digital-era students [8].

In foreign digital pedagogy, the term New Generation Digital Learning Environment (NGDLE), defined by M. Brown, J. Dehoney, and N. Millichap. They say that this environment "must be digital, given that digital technology has become a component of virtually all teaching and learning practice. It must be about learning, since learning ties together learner and instructor. Finally, it must be an environment or ecosystem – a dynamic, interconnected, ever-evolving community of learners, instructors, tools, and content" [9, p. 3].

Based on the analysis of national and foreign scientific literary sources and trying to meet the changing needs of higher education, **the purpose of the article** is to design digital learning environment through describing its core domains for primary school teachers training that should replace learning management systems.

2. METHODS

For achieving the purpose of the research, the authors use a set of theoretical methods. They are methods of analyzing and generalizing the data sources in which the study results of both Ukrainian and foreign scientists in the sphere of modeling and implementing the learning environment for teacher education are presented. Also, this study uses the method of modeling the digital learning environment based on generalizing the theoretical findings and practical experience of developing digital learning environment. Modeling is thought to be a general method of scientific research that includes the construction and the research of special models. So the method of modeling is used for developing the artificial object which is similar to analogues of other objects, but not fully identical to them. Such models in pedagogical research have the following functions: a) illustrative that implies visualizing the modelled object; b) transferring that includes studying the process of designing all the components; c) explanatory that is aimed at monitoring the effectiveness of modeled environment; d) predictive that focuses on the further development of learning environment.

3. THE RESULTS OF THE STUDY

Trends in the introduction of modern information technologies in the learning process of the most developed countries show that there is currently a process of dramatic change in the education system. There is a modernisation of educational establishments in accordance with modern requirements of the education quality. One of the leading challenges facing university teachers is not only the introduction of the distance education system, but also the provision of a favourable impact of new technologies on the educational process. It should be noted that distance education in Ukraine has a strong legal basis, in particular in the Law of Ukraine "On Higher Education" (2014), distance education is distinguished among the institutional forms of higher education [2]. Besides, in the "Regulation on Distance Learning" (2013) [10] the term "distance learning" is explained as an individualized process of acquiring knowledge and skills, which occurs mainly through indirect interaction of the participants in a specialized environment, which operates on the basis of modern psychological and pedagogical and information technology.

Various aspects of distance learning are studied by Ukrainian scientists V. Bykov, N. Zhevakina, V. Kukharenko, V. Oliynyk, American and European researchers T. Bates, D. Clark, F. Chetwynd, S. Dobbyn, M. Simonson, S. Smaldino, and others.

In full agreement with V. Kukharenko, we consider the main form of distance learning as a teacher-designed learning activity for learning structured information, as a reproduction of the traditional educational process by means of ICT (communication, collaboration, co-creation, independent work etc.) [4].

An important factor of the successful implementation of any distance learning course is effective teacher feedback from students. F. Chetwynd, C. Dobbyn and other researchers point to its positive effects, including the achievement of learning goals, the development of self-esteem in the learning process, positive motivation, encouraging teachers and students to engage in dialogue in the learning process, and others [11]. Therefore, organizing effective feedback is one of the key tasks in the distance course designing.

It should be noted that in the scientific and pedagogical data sources, the terms "distance learning" and "distance education" are often used synonymously. However, they are significantly different from each other, just as they are generally pedagogical concepts of "learning" and "education". It is known that in pedagogical science since the time of J. Pestalozzi learning is considered as the way of education, which is the result, the ultimate goal of learning. Therefore, the concept of "distance education" is broader than "distance learning", which does not exclude the possibility of using these concepts as synonymous.

Scientific researches of domestic and foreign scientists have proved the advantages of distance learning, among which:
- flexibility of education: choice of an education institution, place and time of study;
- information security: access to the set of educational materials in electronic form directly from the server of the higher education institution and Internet resources;
- individualization of learning: sequence of discipline study on the basis of an individual schedule;
- interactive learning: providing feedback and ongoing support;
- parallelism of studies: possibility of simultaneous study in several institutions, including foreign ones;
- high self-organization of the students: striving for knowledge acquisition, enhancing creative and intellectual potential, mastering the latest information technologies.

At the same time there are also disadvantages of distance learning:
- lack of direct face-to-face communication between the students and teachers;

- strong requirement for appropriate technical tools and software, access to information and use of distance learning tools;
- the key problem is the problem of user authentication in the knowledge test;
- no permanent control over the students;
- lack of practical work;
- high costs for designing and creating a distance learning system, organizing distance learning courses and purchasing the necessary equipment;
- the development of distance learning courses is a very time consuming process.

However, the effective use of distance learning technologies in education can greatly improve the effectiveness of learning and reduce its costs.

The course "Digital Technologies for Teaching and Research" is designed according to the model of designing pedagogical scenario of the learning course for digital learning environment ADDIE, which includes five stages:

- analyses (of the content, learning environment, program support ant electronic tools);
- design (defining expected learning outcomes, teaching methods and method of assessment, detailing content in terms of topics);
- development (preparing the exercises, tasks, project topics, etc., planning the course organization and its uploading to the learning management system);
- implementation (training, organising interaction with students);
- evaluation (determining whether the learning objectives have been achieved, whether the content and teaching methods are corrected)

The special course "Digital Technologies for Teaching and Research" is implemented into future primary school teacher's training in the SHEI "Donbas State Pedagogical University". The course is created using the LMS MOODLE. The course consists of four modules which integrate the themes. The content of the course is presented below.

Module 1. Global Trends of Digitalisation in Education (Fig. 1).

The objectives of the module are: to consider the university as a space of digitalisation; to analyse the concepts "digital culture", "digital literacy", "digital competence"; joining students to the European digital educational community.

The module covers the following themes:

1. The digital turn in higher education.
2. Methodical and methodological approaches for higher education in the digital age.
3. Digital literacy, digital capacity and individual agency.

The lectures will be video recorded and students will be allowed to watch them at their convenience. At seminars students will apply knowledge from the lectures and background lectures to take part in discussions on the issues of digitalization of education. Testing will be used for measuring students' understanding of digitalization issues. To take the learning process outside of the classroom, students carry out the projects, e.g. book review, and upload their results to the cloud or creating postcards.

Module 2. Digital Skills for Teaching.

The objectives of the module are: developing future teachers' pedagogic and digital skills for teaching affectively; changing the educational operating culture into a culture promoting openness, participation and sharing through the internet; empower students by providing them with e-tools for teaching; to train students for further designing and implementation of electronic learning tools in their professional activities.

The module contains the themes:

1. Multimodal teaching practices.
2. Programming in teaching environments.
3. Computer gaming in classes.
4. Multimedia learning tools for teaching and learning.

5. School management and digitalization trends.

The methods are interactive lectures, including flipped learning, using mobile learning and social networks to create a new community, as well as to enter existing teaching communities; having brainstorming sessions in forum; interactive learning; student-centered learning; practical tasks on how to implement e-tools at different lesson stages.

Module 3. Digital Research Competence

It comprises the following themes:

1. Digitalisation of education and creating unified learning environment.
2. Scientometrics of modern education, scientometric bases and copyright.
3. Implementing ICT at the stage of presenting the results of pedagogical research.
4. Software for conducting the research.
5. Using ICT tools at the stage of implementing research results of the experiment.
6. Tools for distance and blended learning at the pedagogical research.
7. Computer technologies at the stage of analysing experimental data.
8. Computer technologies at the stage of interpreting of experimental data. Multimedia tools.

The students have to study theoretical materials and multimedia presentations to the themes, do the practical tasks and upload them to the Google Disk; they also fulfil the tasks independently and send to the tutor through Moodle platform.
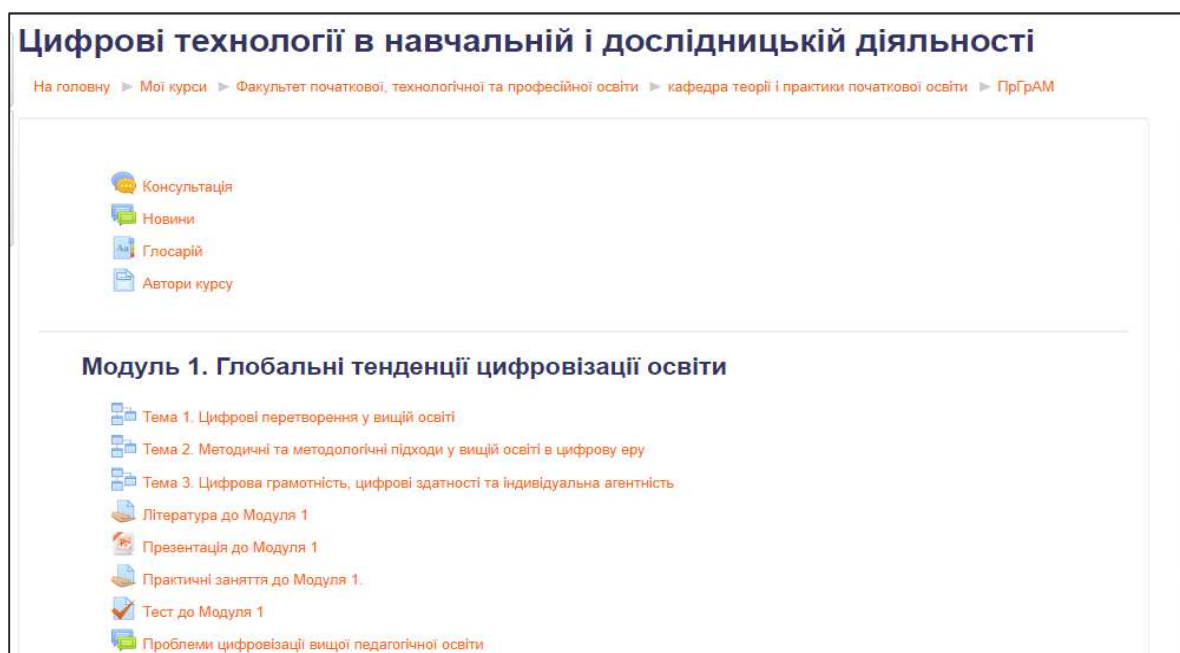

Fig. 1. Example of a Module content "Global Trends of Digitalisation in Education" presented in the course

Methods and techniques used in the course comprise: creating personal learning environment; working in the social networks: forums, blogs, surveys; acquiring Internet-services for designing e-tutorials, info-graphics, multimedia presentations, mind maps, interactive posters, testing; working in international scientometric databases; self-assessment.

Module 4. Digital Culture and Academic Integrity.

The objectives of the module are: developing students' digital culture while conducting practical activities and researches to control and choose technology that will benefit society; improving skills to access and search for information efficiently and effectively using a variety of digital tools; equipping students for full participation and engagement with their

studies by building awareness and understanding of the core values and expectations of academic culture; comprehending the concept of academic integrity and getting aware of the fundamental values associated with it.

The module contains the following themes:

1. Introduction to Digital Culture at Universities. Defining, Accessing & Searching for Information.
2. Critically Evaluating, Filtering & Managing Information.
3. Digital Strategies, Methods and Innovation.
4. Academic Integrity Policies in Europe and Ukraine.
5. Academic Integrity: Values, Skills, Action.

All the lectures and seminars contain videos, articles, activities and quizzes that will help the students develop the knowledge and skills needed to be a successful and ethical learner, teacher and researchers. There will also be opportunities for them to discuss their ideas with other students and learn from their experiences and points of view. In addition to core theoretical part students will be involved into practice-based activities, individual and team-based projects.

At the end of each module and at the end of the course students have tests. Some examples of the testing tasks are presented in Fig. 2.
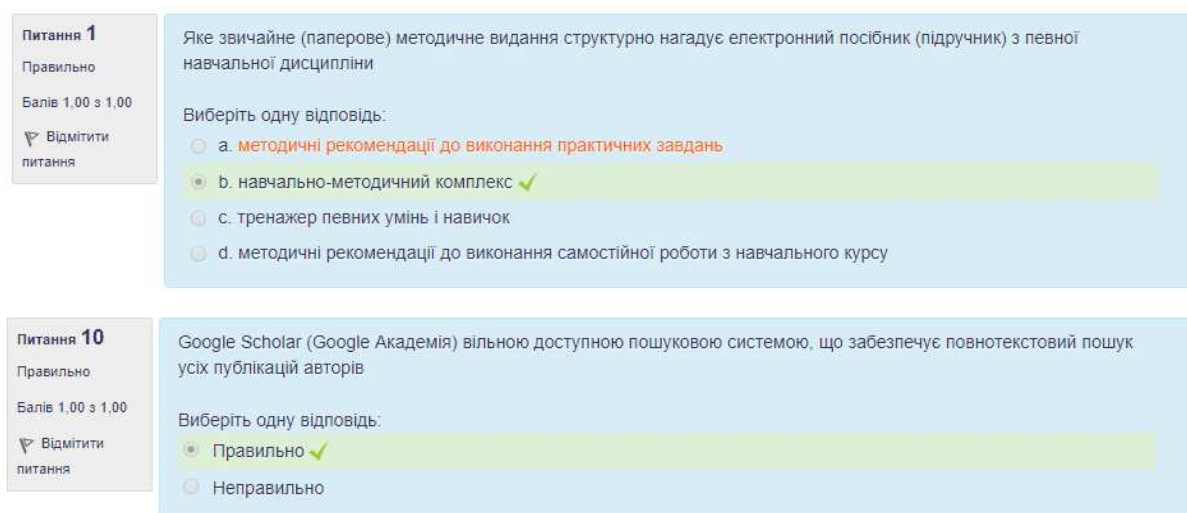

Fig. 2. Examples of the testing tasks in the course "Digital Technologies for Teaching and Research"

From that what is mentioned above and data sources analysis, it's obvious that educational technology has evolved from the learning management systems to massive online open courses and personal learning environments. According to the researches of Ukrainian (V. Bykov, O. Buinytska, N. Voronova, M. Shyshkina), LMSs are still the main pillar for organizing the distance learning at universities [6; 12; 13]. The foreign researchers M. Brown, J. Dehoney, G. Dobbin, and N. Millichap agree that learning management systems are widely used at universities abroad [2; 14]. However, they assert that LMSs perfectly ensure administration functions, but not learning one. The research of P. Panagiotidis, defining the NGDLE as post-LMS environment, reveals that in 2016 85% of foreign LMS users preferred the cloud services for developing digital learning environment [15].

Trying to replace the emphasis from the instructor on the student and to make the training at university student-centered, M. Brown, J. Dehoney, and N. Millichap have conducted the research within EDUCAUSE activities and introduced the term New

Generation Digital Learning Environment (NGDLE) which combines instructional practices, open learning content, and educational services and applications. NGDLE doesn't exclude the use of LMS in higher education institutions. LMS can be one of the core components of the learning environment, preserving the features of administrative tool and mainstay for learning materials. Each higher education institution should choose a number of clusters for developing the learning environment [9].

M. Brown, J. Dehoney, and N. Millichap insist on including five main functional domains into the NGDLE for its full realization [9]. They are the following:

1. Interoperability and Integration.
2. Personalization.
3. Analytics, Advising, and Learning Assessment.
4. Collaboration.
5. Accessibility and Universal Design.

Interoperability and Integration implies that the curricular content in courses must be added to the environment where it can be exchanged, transferred and utilized. The digital learning environment is to remain the main source of learning materials through, as well as it must contain electronic learning tools, namely e-books, tutorial, quizzing tools etc.

Personalization ensures the activities of students and instructors for building the environment. It means that the learning environment provides students with training that corresponds to their professional needs.

Analytics, Advising, and Learning Assessment is an important component of the learning environment as it gives faculty and department administrators an opportunity to obtain the information about the training progress and the effectiveness of the developed learning environment through analysing both the design and the implementation of the instructional courses.

Collaboration is claimed to be a fundamental pillar of the educational process. Digital technologies broaden the opportunities to achieve the instructional goal collaboratively. Due to technology-supported training students can organize the collaboration with the university lecturers at all levels.

Accessibility and Universal Design involves supporting the opportunity for students and instructors to be active participants with an access to the learning data and to create accessible artifacts.

The implementation of Next Generation of Digital Learning Environment has been successfully realized since 2014 in universities in the USA. M. Brown, J. Dehoney, M. Lynch, and N. Millichap consider NGDLE to be an ecosystem – a learning environment that includes different learning tools and ensures the digital support of education [16]. The digital learning environment modelled for primary school teacher training at SHEI "Donbas State Pedagogical University" doesn't contradict the functional structure of NGDLE, proposed by American scientists, as well as the modelled clusters correlate with the functional domains of NGDLE (Fig. 3).

The digital learning environment modelled for primary school teacher training contains six clusters: Distance Courses, Digital Teaching and Learning Resources, Internet Conferences, Webinars, Student and Teacher E-Portfolios, Forum. The cluster "*Digital Teaching and Learning Resources*" includes electronic learning tools (e-textbooks, tutorials, for supporting primary school teacher training that are tied together with the syllabus of the courses, such as "Children Literature with Teaching Methods", "I Explore the World", "Introduction to Specialty". Digital Teaching and Learning Resources are developed according to the requirements of "Regulations on Electronic Textbooks", namely they include the course content, are based on the principles of competency-based approach and open

education principles. They also contain tasks for self-assessment, group work, open questions, as well as tasks of creative and exploratory nature.

The cluster "*Distance Courses*" contains links to the courses, which are included in the curriculum of primary school teacher training and have already been designed at LMS Moodle. The Moodle courses are thought to be successfully integrated into the modelled digital learning environment.
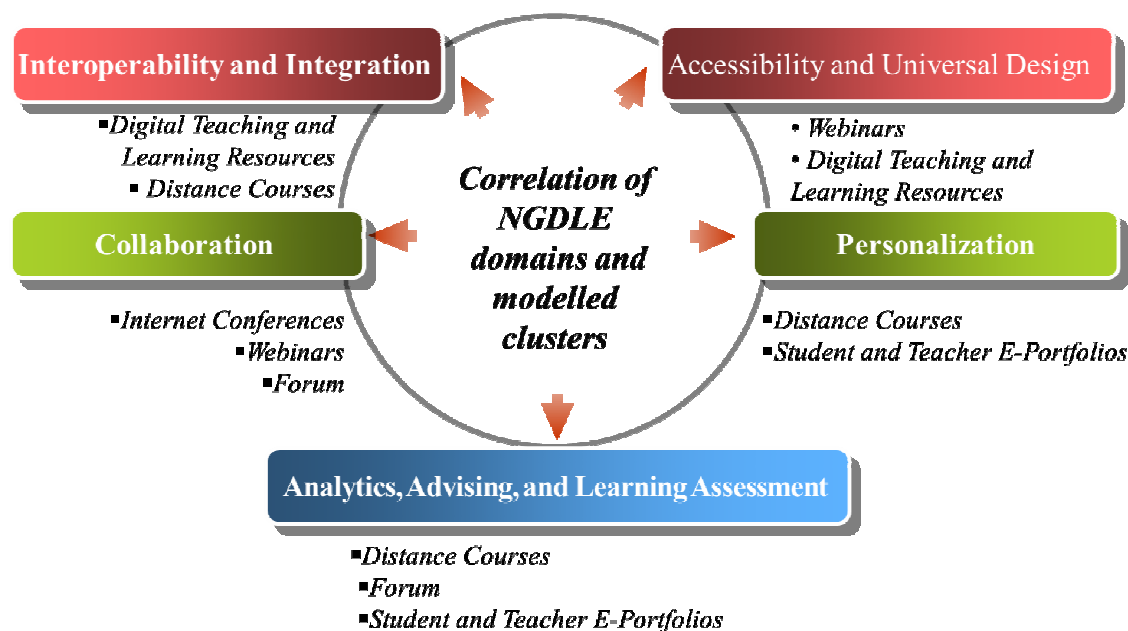

Fig. 3. Correlation of NGDLE domains and modelled clusters

The cluster "*Internet Conferences*" contributes to the communication and collaboration of researchers, university lecturers, school teachers, and students through the use of special electronic tools which support the online audio and video connection. The digital learning environment enables the mutual exchange of messages and files, joint decision making and document editing. Internet Conferences give students an opportunity to participate in scientific events and shape their digital learning environment experience.

The cluster "*Webinars*" in the structure of digital learning environment is thought to be an important tool of communication and education. It should cover the relevant themes that concern future primary school teacher professional development. The platforms for organizing webinars are adaptive, available and easy to use. They are MyOwnConference, Google Hangouts, Facebook live, Skype Group Calls.

The cluster "*Forum*" is modelled for supporting the communication among students and instructors, exchange of ideas, organizing discussions, making announcements that concerns the learning process at the university.

The cluster "*Student and Teacher E-Portfolios*" is an electronic repository that contains scientific and methodological finding of the instructors and student data for producing actional reports and information. The instructor data cover the information about: scientific papers that are published in the journal, being included into scientomentric databases Scopus and Web of Science, being indexed by Index Copernicus etc.; teaching tutorials designed and published by the instructor; electronic versions of the paper textbook editions etc. The student data contain their course activities and engagement, as well as student artifacts, such as essays, blog posts, media products.

4. CONCLUSIONS AND PROSPECT FOR FURTHER RESEARCH

The analysis of foreign and Ukrainian scientific sources has shown that the new generation of digital educational environment (NGDLE) are beginning to spread in American and European educational practice, as a result of the evolution of traditional learning management systems and their convergence with the principles of open learning. Currently, the next generation digital educational environment is evolving from a free but fuzzy set of tools and resources to a reliable and powerful learning environment that can replace existing e-learning systems.

We fully agree with the position of foreign scientists on the complexity of the transition to the next generation of electronic learning tools, because the combination of different digital resources, the coexistence of LMS and various tools in each course can lead to a technically complex environment and it takes a lot of time. In addition, the next generation of educational resources requires a reformulation of learning principles that will encourage educational institutions to create the next generation digital learning environment.

The experience of the initiative group of the scientists in designing the educational digital environment for teaching and research is described in the article. This platform is completely intuitive educational environment which combines virtual training of future primary school teachers, holding the conferences and webinars, the efficient collaboration between scientists, lecturers, university students and school teachers. A promising area of the research is the use of the developed model as a constructive basis of design works on informatization of future primary school teacher professional training.

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МОДЕЛЬ ЦИФРОВОГО ОСВІТНЬОГО СЕРЕДОВИЩА ДЛЯ ПІДГОТОВКИ ВЧИТЕЛІВ ПОЧАТКОВОЇ ШКОЛИ

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Анотація. Процеси інформатизації освіти в останні роки пов'язані з її цифровізацією, відбувається певне переформатування електронних освітніх ресурсів, формується нове покоління навчальних засобів – цифрові освітні ресурси. Сьогодні перевага віддається відкритим освітнім ресурсам, які можуть працювати на будь-якому цифровому пристрої, тобто відкритим цифровим освітнім ресурсам. Висвітлено досвід використання дистанційного курсу «Цифрові технології для навчання і досліджень» у професійній підготовці майбутніх учителів початкової школи в ДВНЗ «Донбаський державний педагогічний університет». Аналіз практичного застосування дистанційного курсу і вивчення зарубіжних наукових і методичних джерел засвідчує необхідність формування й розвитку цифрового освітнього середовища майбутнього покоління (Next Generation of Digital Learning Environment, NGDLE).
Виокремлено й проаналізовано п'ять основних функціональних особливостей названого середовища, що забезпечують його повну реалізацію: взаємодія та інтеграція; персоналізація; аналітика, консультування та оцінка навчання; співпраця; доступність та універсальний дизайн. Розроблено модель освітнього цифрового середовища для навчання та досліджень, що являє собою повністю інтуїтивну платформу для інтеграції віртуальної підготовки майбутніх учителів початкових класів, проведення конференцій та вебінарів, ефективної співпраці між науковцями, викладачами, студентами університету та вчителями шкіл. Схарактеризовано кластери платформи (дистанційні курси, цифрові навчальні ресурси, інтернет-конференції, вебінари, електронні портфоліо для студентів та викладачів, форум), які відповідають зазначеним функціональним особливостям цифрових освітніх середовищ майбутнього покоління. Доведено, що нове покоління освітніх ресурсів формується внаслідок еволюції традиційних систем управління навчанням (Learning Management Systems, LMS) та їх зближення з принципами відкритої освіти і гнучким персональним освітнім середовищем.

МОДЕЛЬ ЦИФРОВОГО ОБРАЗОВАТЕЛЬНОГО ПРОСТРАНСТВА ДЛЯ ПОДГОТОВКИ УЧИТЕЛЕЙ НАЧАЛЬНОЙ ШКОЛЫ

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Аннотация. Процессы информатизации образования в последние годы связаны с его цифровизацией, происходит определенное переформатирование электронных образовательных ресурсов, формируется новое поколение учебных средств – цифровые образовательные ресурсы. Сегодня предпочтение отдается открытым образовательным ресурсам, которые могут работать на любом цифровом устройстве, то есть открытым цифровым образовательным ресурсам. Освещен опыт использования дистанционного курса «Цифровые технологии для обучения и исследований» в профессиональной подготовке будущих учителей начальной школы в ГВУЗ «Донбасский государственный педагогический университет». Анализ практического применения дистанционного курса и изучение зарубежных научных и методических источников свидетельствует о необходимости формирования и развития цифрового образовательного пространства будущего поколения (Next Generation of Digital Learning Environment, NGDLE).

Выделены и проанализированы пять основных функциональных особенностей названного пространства, которые обеспечивают его полную реализацию: взаимодействие и интеграция; персонализация; аналитика, консультирование и оценка обучения; сотрудничество; доступность и универсальный дизайн. Разработана модель образовательного цифрового пространства для обучения и исследований, которая представляет собой полностью интуитивную платформу для интеграции виртуальной подготовки будущих учителей начальных классов, конференций и вебинаров, эффективного сотрудничества между учеными, преподавателями, студентами университета и учителями школ. Охарактеризованы кластеры платформы (дистанционные курсы, цифровые учебные ресурсы, интернет-конференции, вебинары, электронные портфолио для студентов и преподавателей, форум), которые соответствуют указанным функциональным особенностям цифровых образовательных пространств будущего поколения. Доказано, что новое поколение образовательных ресурсов формируется в результате эволюции традиционных систем управления обучением (Learning Management Systems, LMS) и их сближение с принципами открытого образования и гибкой персональной образовательной средой.

Ключевые слова: цифровое образовательное пространство; системы управления обучением; дистанционный курс; модель; подготовка учителей начальной школы.