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**THE RESULTS OF THE DIGITAL ENVIRONMENT DEVELOPMENT IN PEDAGOGICAL UNIVERSITY FOR TEACHER CONTINUOUS TRAINING IN THE FIELD OF E-LEARNING**

*Abstract:*

For the support of the high quality of education in modern conditions Belarusian state pedagogical university named after Maxim Tank (BSPU) implements a conceptual model of e-learning, which focuses on the transition from a linear management model "e-university" to a digital ecosystem. The digital ecosystem is seen as an open nonlinear dynamic socio technical horizontal system that integrates various global and local, interinstitutional information and educational environments and electronic resources, provides interaction of internal and external actors, related to the common goal of cooperation to achieve the "immersion" effect in extracurricular digital activities of students. The article presents the practical results of the formation of the digital ecosystem at the institutional and regional level.

*Key words:*

digital environment, digital ecosystem, informatization of education, e-learning

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**РЕЗУЛЬТАТЫ РАЗВИТИЯ ЦИФРОВОЙ ЭКОСИСТЕМЫ ПЕДАГОГИЧЕСКОГО УНИВЕРСИТЕТА ДЛЯ НЕПРЕРЫВНОЙ ПОДГОТОВКИ УЧИТЕЛЕЙ В ОБЛАСТИ ЭЛЕКТРОННОГО ОБУЧЕНИЯ**

*Аннотация:*

Для поддержки высокого качества образования в современных условиях в БГПУ реализуется концептуальная модель электронного обучения, которая ориентирует на переход от линейной модели управления «электронный университет» к цифровой экосистеме. Цифровая экосистема рассматривается как открытая нелинейная динамическая социотехническая горизонтальная система, которая интегрирует различные глобальные и вузовские, межвузовские информационно-образовательные среды и электронные ресурсы, обеспечивает взаимодействие внутренних и внешних субъектов, связанных общей задачей сотрудничества по достижению эффекта «погружения» будущих педагогов в разные виды цифровой учебной, внеучебной деятельности. В статье приведены практические результаты становления цифровой экосистемы на институциональном и региональном уровне.

*Ключевые слова:*

цифровая среда; цифровая экосистема; информатизация образования, электронное обучение

In Belarus a key activity for all universities in the country until 2025 is the expansion of using network and distance educational technologies. This goal assumes the development of horizontal management formation based on partnerships, the creation of practice-oriented structures in universities, career-planning centers and network professional communities based on information-communication technologies (ICT) [1].

The importance of the constant development of the digital environment of universities and, in general, the formation of the republican information and educational environment taken as one of the conditions for improving the quality of education. For the system of higher pedagogical education in modern conditions, an urgent task for universities is the training teachers capable for e-learning in digital environment and network pedagogical interaction [2-4].

At the same time over the past 10 years, in the context of complex informatization of education, an understanding of a digital environment as a system of tools and resources that provide conditions for the implementation of educational activities based on ICT formed. However, the general trend of informatization of education remained the orientation towards the automation of already established management procedures (linear model of university management). This approach led to the formation of a common concept of the digital environment of the university as a set of hardware, software and other means that ensure the creation, storage, processing and transmission of information for access to certain educational resources, supporting information processes for managing the university.

As a result, the target orientation, architecture, implemented technologies for organizing the work of a digital environment in various universities presented quite uniformly. Such environments consist of some typical and integral parts: computer equipment, network infrastructure, the web-portal of the university, university management software, learning management systems, repositories, presence in social networks and services (Facebook, LinkedIn, VK, YouTube).

Considering the fact that Belarusian state pedagogical university named after Maxim Tank (BSPU) is the leading pedagogical university in the country the goal of this article is to describe the deliverables of modernizing the educational process in digital environment for training teachers capable for e-learning. BSPU also coordinates a republican partnership of pedagogical educational institutions which is called educational research and innovation cluster [6]. [Cluster](https://bspu.by/klaster) plays an important role in the development of the regional system of continuous teacher training. In these conditions the implementation of BSPU deliverables in development of cluster digital environment can influence on the whole system of pedagogical training in Belarus.

Since 2015 the digital environment of BSPU has developed in line with the general trends mentioned above [5]. As a result, the architecture of the digital environment of BSPU by 2022 consists of the following components:

1. ***Technical and telecommunication infrastructure***, which includes networks, technical means of informatization, software for general purpose, information security technical support systems, computer and interactive multimedia equipment, e-mail and video conferencing systems.

2. ***Systems for the educational process support:*** learning management systems, various kinds of e-resources (electronic libraries, databases, repositories, electronic services).

3. ***Information systems and software for university management,*** which provide collection, processing, storage and transmission of data on students and personnel, educational documents, automation of accounting and other systems.

Taking into account the latest requirements for universities on the moving to new innovative practices and the specific character of teachers’ training in the field of e-learning technologies the conceptual approaches of the BSPU digital environment development revised in 2019. The main idea for the development of a new conceptual model of e-learning was the widening of e-learning technologies application (as means of teachers’ training) in BSPU and in Cluster, as well as updating the content, forms, methods of forming relevant ICT competencies and information culture of the teachers (as one of the goals of teachers’ training) [7].

The leading idea of the model was the formation of relevant ICT competencies and information culture of the future teacher, based on an understanding of the specific role of pedagogical interaction and the features of e-learning in the digital environment. According to this model, the training of a teacher based in an innovative-advanced way, where a digital ecosystem of pedagogical training created. The digital ecosystem considered as an open nonlinear dynamic socio technical horizontal system that integrates various global, national, university, inter-university services and educational e-resources, includes different stakeholders associated with the common object of cooperation for achieving the effect of "diving" of future teachers in various e-learning activities.

The digital ecosystem in a pedagogical university includes subsystems: digital resources, online learning, e-learning trajectories, network communities, scientific innovations, e-services. Let us describe the practical results of the implementation of the development of the digital ecosystem of pedagogical training at the present stage (Minich, 2020).

*The main practical results following* the **development of the subsystem of digital resources** from 2019 are:

* modernization of the study course "Information technologies in education" which is included as compulsory state component of the curricula for all pedagogical specialties within the framework of the implementation of the Erasmus + project IESED;
* development of new curricula of elective disciplines (“Technologies of network pedagogical interaction”, “IT project management”, etc.);
* inclusion into the curricula of study courses on teaching methods of school subjects modules or sections of ICT technologies; A selective analysis (2021) of 26 curricula on teaching methods at 5 faculties of BSPU showed that the study of using ICT is included in their content, course papers and theses on this topic are planned;
* constant growth of the collection of e-resources for teachers’ training for all study courses (the number of open online resources, courses, video content is growing every year).

**The BSPU online learning subsystem** as a means of e-learning in a digital environment has also significantly expanded the effect of "diving" of future teachers in various e-learning activities. From 2020 the implementation of such platforms as BigBlueButton and MS TEAMS in BSPU digital environment allowed to widen the channels for pedagogical communication between teachers and students and to rise using the blended learning model in the university. For example, in September-October 2021 more than 700 only online training events held on these two platforms.

At the regional level the active development o**f the online learning subsystem in BSPU** is associated with the republican educational online project "Future teachers for children!", initiated by BSPU in 2020 in order to support schoolchildren during the pandemic COVID-19. The project joined students, teachers from BSPU, students from pedagogical classrooms in schools, schoolteachers and BSPU alumni. During the period of the project implementation more than 200 online lessons on different school subjects and grades were held. In April 2020 the BSPU project was included by the International Foundation "Aflatoun International" in the list of the best projects for distance learning of children. Videos of these online lessons were posted on BSPU YouTube channel and on a new resource – [Online BSPU school](https://moodle-rus.bspu.by/local/crw/index.php?cid=1&crws). Such kind of involving students of pedagogical university in the process of e-content creation proved its efficiency and in 2021 the participation in republican educational online project "[Future teachers for children!](https://rcpeo.bspu.by/157-2/onlajn-proekt-budushhie-pedagogi-detyam/)" was assigned as a part of Pedagogical Practice in the field of e-learning methods and network pedagogical interaction. The resource Online BSPU school is used for creating students’ IT projects for e-learning in study course "Information technologies in education".

The development **of the subsystem of e-learning trajectories** is focused on the formation of educational and methodological support for e-learning by designing *interactive electronic educational and methodological complexes based on LMS* *Moodle.* The basis for such e-content lies the competence-oriented methodology, where educational results described by the descriptors of competences in LMS. According to such a concept, in 2019 BSPU introduced a system for the development and multi-stage examination of interactive electronic educational and methodological complexes. It allowed increasing the proportion of quality e-resources for the digital environment: among more than 1700 e-resources 18% refers to interactive electronic educational and methodological complexes. At the level of Cluster the digital environment of BSPU suggests several open e-courses, activities and initiatives on pedagogical experience exchanging in the development of interactive e-courses such as: Online BSPU school, MOOCs on Stepik, E-courses created during [Erasmus+ project IESED.](https://iesed.akolegija.lt/)

**The development of the subsystem of network communities** has increased the role of independent partnerships and assessments in network learning communities created for the implementation of various projects. Student thematic network communities, for example, the network community StudTV BSPU, forms the skills of creating a screen image, which has become relevant due to the growing demand for online learning. Participation in such extracurricular projects allows students to "try on" various roles, practice ways of conducting a virtual dialogue with an online audience, structuring the presentation of information, and means for motivating online learners.

The infrastructure for non-formal professional development is also the network communities of teachers-practitioners, whose activities and participants go far beyond the BSPU, attracting partners of the Cluster, institutions of general secondary education. Becoming an active participant in professional discussions and practice-oriented projects allows teachers to expand and develop their individual information and educational environment.

**The subsystem of scientific innovations** as a potential effect provides for the expansion of the network of resource centers, the inclusion of student research laboratories (SNIL) in the study of the problems of e-learning. Among the 42 SNIL operating in the BSPU, 12 are the most actively involved in the problems of e-learning. The coordination of scientific and methodological innovations in the field of e-learning at the university is carried out by the Republican resource center “[Network Academy of Pedagogy of E-Learning](http://new-rcpeo.bspu.by/)”. On the basis of this center the activities of creative groups of student volunteers and teachers are included in developing e-content, different scientific projects. For example in 2021 international projet “[Strategies for implementation of modern IT solutions for teacher training in Belarussian pedagogical universities](https://rcpeo.bspu.by/157-2/mezhdunarodnyj-proekt-razrabotka-strategij-vnedreniya-sovremennyh-ikt-reshenij-dlya-uchebnyh-sistem-v-pedagogicheskih-universitetah-belarusi/)” was implemented with the participation of Narva College of the University of Tartu (Estonia) and Belarusian universities from Cluster. As a result, training courses for teaching development for a strategic modeling of e-learning developed.

Constant technical and technological support of the educational process is also provided through the development of **e-services subsystem** which makes it possible to move to complete e-management in the digital environment BSPU. This subsystem combines the main typical components of the digital environment but among perspectives of their further development we would like to outline the following areas:

* creation of a comfortable online environment for managing individual learning on the base of unic account for all services in digital environment;
* development of a complete instrument for implementation of individual educational trajectory on a competence basis which ensures flexibility in the creation of educational programs, the formation of additional competencies.

**Findings:**

The transition to the conceptual model of e-learning made it possible to create a toolkit for pedagogical training of the use of e-learning technologies, as well as updating the content, forms, methods of forming relevant ICT competencies and information culture as *digital ecosystem* at different levels.

At *the institutional level, the digital ecosystem of pedagogical training* contributes to the creation of additional pedagogical and organizational-technological conditions to stimulate independent educational and extracurricular activities of students in the digital environment, for the conscious formation of professional ICT competencies and information culture of the future teacher. In this model, the student becomes a participant in his professional formation, and not only a passive "recipient" of a certain amount of knowledge and skills, forms his methodological portfolio on application of various methods and technologies of e-learning to perform professional and pedagogical tasks.

*At the regional level*, the formation of a digital ecosystem makes it possible to include inter-university teams of students and teachers on a project basis in the pedagogical training process, the network horizontal interaction of professional and educational research communities, the expansion of scientific research and the organization of pedagogical practice of e-learning in Cluster.

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