Digital educational environment as a tool of complex changes of the teacher's pedagogical activity

Entorno educativo digital como herramienta de cambios complejos de la actividad pedagógica del profesor

Sergeeva M. G.*
Far Eastern Federal University - Russia
Gornostaev O. M.**
Far Eastern Federal University - Russia
Gornostaeva T. N. **
Far Eastern Federal University - Russia
gornostaeva.tn@dvfu.ru
Kostenko A. V. ***
Far Eastern Federal University - Russia
Sinko V. G. ***
Far Eastern Federal University - Russia
Sinko O. V. ***
Far Eastern Federal University - Russia

ABSTRACT

The authors of the article identified four basic functions of the use of information technology in the course of training future representatives of a profession: information and training, forming, evaluation and correction, research. It is noted that these functions do not operate separately, but as elements of a single system, depending on the conditions determined by the features of the information EE. The analysis allows the authors of the article to assert that at this stage of the educational process evolution the main task is to create a methodology related to the use of information management technologies in the development of electronic materials of educational nature and their implementation in the context of pedagogical activity.

Keywords: educational environment, innovative environment, software, information management.

RESUMEN

Los autores del artículo identificaron cuatro funciones básicas del uso de la tecnología de la información en el curso de la capacitación de futuros representantes de una profesión: información y capacitación, formación, evaluación y corrección, investigación. Cabe señalar que estas funciones no funcionan por separado, sino como elementos de un solo sistema, dependiendo de las condiciones determinadas por las características de la información EE. El análisis permite a los autores del artículo afirmar que en esta etapa de la evolución del proceso educativo, la tarea principal es crear una metodología relacionada con el uso de tecnologías de gestión de la información en el desarrollo de materiales electrónicos de naturaleza educativa y su implementación en el contexto de actividad pedagógica.

Palabras clave: entorno educativo, entorno innovador, software, gestión de la información.

*Doctor of Pedagogic Sciences (Advanced Doctor), Associate Professor, Senior Research Officer; Research Institute of the Federal Penitentiary Service of Russia
**Ph.D., Associate Professor, Far Eastern Federal University, School of Pedagogy
*** Ph.D., Associate Professor, Far Eastern Federal University School of Education

Recibido: 30/03/2019 Aceptado: 04/06/2019

Introduction

Social and cultural factors contributing to the formation of an open information society in our country (the growing popularity of distance education, the significant role of the Internet in modern life, the implementation of an increasing number of cognitive operations in automatic mode), led to the update of the list of requirements for a young specialist with higher professional education, ready for active interaction with society in the context of mass digitalization of education.

The main engines of modern education in Russia and abroad are on-line courses, artificial intelligence, cloud computing, etc. Training, and partly an educational process gradually virtualizes that makes people's thinking more fragmented and "file" ("screen"), increases the schism that exists between the familiar, time-tested and innovative technologies in the field of education. Overcoming this conflict contributes to the principle of interactivity, which helps to find a middle ground between traditional and modern approaches to ensuring interaction between teachers and students in higher education. This is achieved by combining full-time and distance learning in the context of a digital environment that requires the employee of the educational organization applied skills – what is a prerequisite for effective learning and interaction in the new social reality, using the capabilities of the Internet, software and means of communication with students during the class. Attention to the further development of the digital educational environment (hereinafter – EE) is reflected in a significant number of scientific articles of applied orientation and is confirmed by the high level of demand for information resources, the integration of information EE elements into the educational process for accreditation, etc.

Creating in secondary school electronic information EE, involving the use of online resources and telecommunication technologies, is prescribed in the Federal law "On education in the Russian Federation" and the FSES of a new type. In addition, the use of high-tech methods and tools in the field of education is provided by a number of state and regional programs: "Information society" (2011-2020), "Development of education until 2025".

The large-scale study "Students of the new Millennium: working on a project", conducted by experts of the Economic Cooperation and Development Organization, describes the impact of digitalization on improving communication skills, especially in areas related to visual thinking and appropriate perception of the surrounding reality (not related to verbal activity). We should also mention the diagnostic success of senior students ("Programme for International Teacher Assessment") to demonstrate that there is a positive relationship between the appeal to information EE and the development of skills based on the communicative approach: the students, deprived of unlimited access to this environment, the results leave much to be desired, amounting to only 63% of the global average. Less than a third of high school students with a very rough idea of computer technology, coped only with the simplest communicative tasks corresponding to the basic level of competence. In particular, the success of these exercises was affected by uncertainty in their sufficient ability to communicate online. According to the results of the global study "The use of innovative technologies by teachers and students" ("Innovative Teaching and Learning"), conducted on the basis of secondary and higher education, the development of communication skills occupies a key place in the context of information EE.

Thus, it can be argued that the formation of communicative competence as a basic property of modern, open personality is a promising task of domestic and foreign education of the first half of the XXI century.

The basis of the digital EE in the context of the application of information management technologies can be special operating systems that integrate information related sciences. Such systems are required to facilitate the integration, accumulation and preservation of this knowledge, as well as to ensure free access to the intellectual resources of the EE, which creates opportunities for:

1) integration of different sources of information in different disciplines, activities and subjects of the educational process (students and teachers) within one system;

2) continuous improvement of the system due to the enrichment of the theoretical database and the constant accumulation of practical experience acquired by teachers and students in the learning process;

3) to find for each student such kind of information which would be consistent with his capabilities and needs and carry out the educational task.

Literature review

The analysis of the works of S.G. Grigoryev, Yu.I. Kapustin, M.P. Lapchik, I.V. Robert, A.N. Tikhonov, O.K. Tikhomirov and several other authors contributed to establishing the following basic functions of the information-type technology application in training future representatives of a particular profession:

1) **information and educational** – obtaining new information in the field of theory and methodology, popularization

of pedagogical innovations;

2) **forming** – aimed at mastering methodological skills, creating models and constructs of the objects and phenomena under consideration, building the educational process as a whole and its specific components (content, teaching methods, etc.);

3) **evaluative and corrective** – involves the use of means of monitoring progress and quality of educational services, the implementation of applied tasks, establishing a stable feedback with students and their parents using the resources of modern EE, etc.;

4) **research** – has a direct relationship to the creative potential of the student (imitative-reproductive and developing-training systems, certified version of practice-oriented programs, exercises on creativity).

The above functions do not act separately, but as elements of a single system, depending on the conditions determined by the features of the information EE – such as the conditions of didactic multi-aspect, adaptability and productive interaction (S.G. Grigoryev, A.A. Kuznetsov).

A significant number of authors (V.P. Bespalko, I.G. Zakharova, S.N. Pozdnyakov, etc.) emphasize the existence of an expressed conflict between two circumstances: 1) the increase in the number and complexity of the content of incoming information, which has a decisive impact on the "content" of education and 2) the limited period of training and mental resources of students and schoolchildren. I.G. Zakharova pays special attention to the persistent contradiction between the stagnation, traditionalist nature of the educational system and the challenges posed to the future specialist by modern high-tech reality, as well as between the need to comply with the FSES and the difficulty of ensuring a personalized approach to students. S.N. Pozdnyakov points to the sense of perplexity that causes the traditional approach to education in modern students familiar with the benefits of computer technology. V.P. Bespalko and S.N. Pozdnyakov consider the discrepancy between the enormous potential of digital EE and its illiterate use in the educational process.

The main idea contained in most of the works can be described as follows: to eliminate the difficulties and contradictions of Russian vocational education we need an effective scenario of creating a digital EE and ways to use it in the educational process. The basic differences are in the interpretation of the digital EE, as well as in the methods of its design and implementation.

As a rule, researchers limit the informatization of education to the creation of adequate software and individual methods of its use in teaching students and training future professionals, without touching the essence, goals, and characteristics of the target audience and other basic aspects of education.

Many modern authors (A.G. Abrosimov, V.V. Grinshkun, S.N. Pozdnyakov, etc.) divide information technologies that make up the new EE into two adjacent, complementary categories: computer and communication. Consequently, teaching and research community aimed at improving educational methods and the development of "advanced" in the spirit of time training materials, taking into account the specifics of their applications using tools for electronic support of the educational process. This worsens the already difficult, in some sense even dangerous situation in the national secondary and higher school, due to the destruction of intra-subject and interdisciplinary ties. Thus, the appeal to the software package "Genius" in the mathematics class is not consistent with the classical content of the discipline and the traditional approach to its teaching in specialized universities, as students do not understand why they need to solve problems on their own (and even in different ways), if the computer copes with them. At the same time, students do not see the need for the development of software packages for the reason that the solution of standard tasks provided by the curriculum does not require the involvement of innovative technologies. As a result, interest in mathematical methods, software packages, and the studied discipline as a whole decreases.

Educational EE is also often perceived as a primarily computer environment (S.L. Atanasyan, I.G. Zakharova, I.V. Robert, etc.). As for the problem of combining habitual and innovative EE sectors, it is considered only in the context of their simultaneous use. However, it should be remembered that such implementation is hindered by the discrepancy between the accepted didactic provisions, methods and conceptual and terminological apparatus, as well as the lack of information and their repetition. The current situation is complicated by the dispersion, imbalance of the emerging information EE, the reason for which is the use of software developed by private companies.

From the point of view of a significant number of scientists, the most important problem of national education (higher and secondary) is the contradiction between high power of computers and low level of used programs, leading to very little productivity of digital EE. We believe that the lack of fundamental approaches to the "content" of education within the new social reality and methods designed on the basis of such approaches is the cause of

the conflict between the possibilities of software products, on the one hand, and new educational tasks, on the other hand.

Proposed Methodology

The analysis of works of A.G. Abrosimov, S.G. Grigoryev, V.V. Grinshkun, Yu.I. Kapustin, A.A. Kuznetsov, M.P. Lapchik, S.I. Makarov, I.V. Robert, N.Kh. Rozov, A.N. Tikhonov, N.F. Talyzina, O.K. Tikhomirov and others allowed allocating following basic functions of the use of information technologies in the process of training in high school:

- information and training function - the acquisition of new scientific and methodological knowledge, the spread of advanced pedagogical technologies;

- forming function associated with the development of methodological skills, modeling and design of the studied objects and phenomena, the design of the learning process and its individual elements (content, form of training, etc.);

- control and correction function involves the use of knowledge control tools, expert training systems, interactive solution of practical problems, the use of tools for the type of programmed tasks for the organization of feedback, etc.;

- diagnostic function related to quality control of training;

- research function is directly related to the formation of creative abilities of the future specialist (simulation-modeling systems, intellectual-training systems, integrated application packages, tasks of a creative nature).

These functions are not isolated, but interconnected and subject to important requirements dictated by the specifics of training and education, such as the requirements of didactic polyfunctionality, adaptability and interactivity (S.G. Grigoryev, V.V. Grinshkun, A.A. Kuznetsov).

Currently, much attention is paid to the study of the processes of remembering, storing, reproducing and forgetting information by a person, as well as identifying cognitive structures in the form of which a person stores information about the world around him. The results of these studies are reflected in the formalization of human knowledge in intelligent systems. Each of the intellectual systems relates to a certain part of the real world — the sphere of human activity, identified and described in accordance with certain goals and called the subject area. Description of the subject area is a set of information: a) about all objects — objects, processes and phenomena, selected from the point of view of the activity; b) about the relationship between the selected objects and/or their parts; c) about all manifested and possible interactions between objects, their parts and relations arising as a result of human activity.

Thus, when creating an intellectual system of an educational organization, there is a problem of creating a specialized knowledge management system through a **digital educational environment**, which on the basis of the accumulated knowledge will allow organizing the educational process in accordance with the rules.

The most effective way to implement changes in the transformation of the teaching content in the new environment, as practice shows, is the formation of a kind of ***"conceptual map",*** which guides the adoption of pedagogical decisions on the selection of material for each topic and, further, indirectly determines the form and style of presentation of the selected material to students. Why is it offered such a concept as a map? Indeed, we are accustomed to linear planning and selection of material, represented, at best, in the form of a simple linear scheme of the algorithm. This form is dictated by the fact that previously educational material was derived from a single source (textbook), where there was a cross-ideological line, while additional materials were used sparingly. Today, with the active evolution of educational content using information technology, for each topic, the material can be selected from different sources, which requires a selection scheme significantly more complex, which today has the form of a "conceptual map".

Result Analysis

The conceptual map combines a sequence of sources of information for each topic of the subject, the purpose of which is not only to give students a certain average amount of knowledge, but also to reflect different opinions and positions, forming a generalized and, if possible, complete picture. Based on the fact that for each topic different and do not coincide with each other sources located on different sites and pages can be used, so this concept is called the map.

Considering its practical implementation, it should be noted importantly that, on the basis of practice, we should make one important observation: conceptual map is not an immutable monolith and can and, in some cases, have to change almost every year, in connection with the emergence of new research, information sources, etc. In other respects, the preparation and, naturally, the definition of the content of teaching stems from personal and professional orientation of the teachers, which reflects the set of knowledge and beliefs in the context of a specific epistemology and substantive subculture with traditions and predecessors. Here, on the one hand, a certain subjectivity is revealed, within which almost all subject teachers, representatives of the same generation, with rare exceptions, work approximately in a single paradigm, at the same time, having great opportunities for individual variations in practice. Here it is necessary to note one important feature of the pedagogical community – resistance to the imposed, both in relation to the content of the subject, and the ways it is conveyed to students. In this case, the mentioned orientation becomes a kind of intuitive measure through which both professional development and educational reforms are interpreted. Research in practical subject areas showed that teachers tend to apply new materials and methods only if these innovations are consistent with their epistemological beliefs and personal professional worldview.

Considering orientations, it should be noted that they are of two types –epistemological and methodological. Thus, teachers with a more constructive orientation are more open to the introduction of ICT and, moreover, tend to choose open software with a large number of practical possibilities. In turn, adherents of transmission pedagogy tend to dosed integration, when ICT is used in a limited way, rather as a tool to implement individual functions or solve specific narrow tasks, such as illustration and visualization. In the second case, naturally, it will not be about the formation of a full-scale conceptual map of the selection and updating of educational content on the subject, but about the implementation of its elements. Similarly, the selection and updating of content is influenced by the epistemological orientations of teachers. They are generally expressed in the personal image and style of teaching and the level of professional competence influenced both the levels of use and the forms of use. In practice, it should be borne in mind that epistemology has several objective types, adherence to which will determine the selection of material and, as a consequence, the style of its presentation. Among them: empiricism; idealism; rationalism; constructivism; pragmatism and skepticism.

Integration of ICT in the process of intellectual development of students as part of the educational process and the goals of professional and pedagogical activity of teachers can be implemented in three general directions – top-bottom, bottom-top and horizontally. The first and second types are at the poles of intellectual development. According to the first type, the only source of knowledge for the student is the teacher or any other expert, and students are acceptors of the knowledge transferred to them in a priori organized educational process. In the second model, the student or group has to find the sources of knowledge on their own and, as a result, organize the learning and development process on their own understanding and responsibility for the results. However, the most common form is the third – horizontal. It involves joint activities for the purposeful development and provision of conditions for self-development of students' intelligence, where all interested actors – teachers, students themselves, invited experts, classmates and parents realize their purpose. Here computer is used for the organization of intensive information exchange and the formation of a special educational-informational and intellectual environment, getting in which the student develops his intelligence and gains some, albeit rudimentary, skills even he is not particularly wanting. The teacher should be objectively the center of this environment, its generator and moderator.

Considering the approaches to the practical implementation of this model, it should be noted that among the largest specific features of this process comes to the fore the confrontation and clash of two paradigms which often determines the practice of transformation. Giving its characterization in the early 2000s, M. Salinger called this situation a clash of teaching using ICT with teaching about ICT. In his study, he showed that often the introduction of ICT in the educational process and professional pedagogical activity of teachers is only a declaration and their real use is replaced by stories about the opportunities that they provide. Therefore, the situation continues when students in the degree of integration of ICT in their lives and individual learning activities, far ahead of teachers and they fall into the position of catching up.

At the same time, it should be noted that the formal integration of ICT in the work of teachers is also clearly not enough. To obtain the necessary positive results of the changes the teacher must carefully plan the implementation so that it took into account not only the specifics of information technology by the teacher, their application for development this or that teaching material but also different levels of pupils' competence in ICT. The lack of equal consideration of these factors can create a discrepancy between the level at which ICT can be used by the student and the extent to which their use is laid down by the teacher for the development of a material. If the ultimate goal is to make ICT a tool that can optimize learning, then both teacher and students should be able to force software and hardware into it.

The introduction of technology in professional and educational activities and the educational process should be

phased. *The first stage* is characterized as trial or experimental. In its course, the teacher integrates ICT elements into the educational process and objectively assesses the results. At the same time, the implementation, even partial, cannot be allowed to drift because, in this case, it will be very difficult to determine a specific result. *The second stage* – the stage of the main implementation, provides for close joint work of teachers and students on the development of ICT not in everyday life, but in the order of educational activities with clear goals and objectives. This stage should correspond to a serious consistent planning and programming of implementation activities with a prior informed prediction of the results of transformations both in the professional activities of the teacher and in the educational process and the work of students. Finally, *the third stage* is the almost endless stage of improvement. This Maxim is not accidental. The XXI century is recognized by UNESCO as the century of lifelong education, and the dynamics of ICT development shows us that major software and hardware updates occur every 2-3 years, which leads to the need to modify the model of ICT integration into the educational process using the latest achievements. The same applies to educational content, which on certain topics can be updated almost annually.

Conclusion

The analysis allows the authors of the article to assert that at this stage of the educational process evolution the main task is to create a methodology related to the use of information management technologies in the development of electronic materials of educational nature and their implementation in the context of pedagogical activity.

The digital EE of the university is defined by us as the infrastructure of pedagogical activity, conducive to the formation of personality in the context of education and consisting of three substructures (information, material and technical and educational), aimed the teachers and students to achieve high learning outcomes. Innovative EE as a complex, multi-aspect system of information and communication technologies combines the information component of the educational process with pedagogical one, increases the competence level of teachers and students.

The authors identified undeniable educational and pedagogical advantages, among which are: the *absence* of a territorial binding of the student to the place of study; *optimization* of financial costs for space, handouts, etc.; automatic fixation of "webinars" on electronic media, which allows further use of the training materials countless times.

BIBLIOGRAPHIC REFERENCES

Abdulatipova E.A., Tsakhaeva A.A. (2017). The logic of designing an evaluation system for the acquisition of pro-fessional skills of future education psychologists. Modern Science Success. Vol. 2. Issue 4. P. 18 – 22.

Abuzjarova M.I. (2018). Tendencies, law of development and economic content of innovative entrepreneurship. Modern Economy Success. Issue. 1. P. 43-50.

Aminova D. K., & Tsakhaeva, A. A. (2018). Effective preparation of the future psychologist as one of the elements of the security education system. International Journal of Medicine and Psychology. Vol. 1. Issue 3. P. 40 – 47.

Ashmarov I.A. (2018). Some approaches to the study of the USSR' military economy in the soviet and russian national historiography. Historical Bulletin. Vol. 1. Issue 2. P. 19 – 31.

Badakhova I.T. (2017). Formation of professionally significant qualities of future managers in the training process forming. Modern Scientist. Issue 7. P. 81 – 84.

Bolotin I.S., Mikhaylov A.A., Sorokina N.D. (2017). Functional literacy of students in terms of introduction of information technologies (on the example of research among the students of MAI). Modern Scientist. Vol. 1. Issue 1. P. 160–163.

Borisov V.I. (2018). Influence of the food crisis for the revolution of the working mass of russia in the years of the first world war (August 1914 - February 1917). Historical Bulletin. Vol. 1. Issue 2. P. 49 – 55.

Borisova I.V., Novoseltseva V.N. (2016). Structure features of intelligence of students of different types classe. Modern Science Success. Volume 3. Issue 2. P. 124 – 130.

Borisova M.V., Musokhranov A.Yu., Sidorova N.A. (2018). Use of fitness directions elements on physical education classes and their psychomatic impact on students of the special medical group. Modern Scientist. Issue 1. P. 6 – 9.

Borovikova T.V. (2017). Methodological bases of formation of the intellectual potential of territories in the conditions of innovative economy. Modern Economy Success. Issue 6. P. 46 – 49.

Gadzaov A.F., Dzerzhinskaya M.R. (2018). Mathematical methods of analysis of the periodic components of economic processes. Modern Economy Success. Issue 1. P. 14 – 18.

Gadzhieva U.B. (2018). Socialization of personality as a factor in the mental, intellectual and spiritual-moral development. International Journal of Medicine and Psychology. Vol. 1. Issue 2. P. 17 – 20.

Gasanova P.G., Daudova D.M, Kabieva R.A., Tsahaeva A.A. (2017). Moral qualities of businessmen in public con-sciousness. Modern Scientist. Vol. 1. Issue 1. P. 209 – 211.

Gnatyuk S.N., Pekert N.A. (2018). Education as a factor of sustainable development of agriculture. Russian Economic Bulletin. Vol. 1. Issue 3. P. 18 – 27.

Ilkevich T.G., Medvedkova N.I. (2017). Sports and recreational activities in the art university as a means of prima-ry prevention of occupational diseases of students –artists. Modern Science Success. Vol. 2. Issue 4. P. 29 – 33.

Kryuchkova K.S. (2018) Modular training of future teachers with the use of information technologies in the conditions of virtual academic mobility. Modern Humanities Success. Issue 4. P. 9 – 14.

Kuznetsov A.A., Ignatyeva T.A., Kuznetsov A.O. (2018). Strategy and key elements of competitiveness. Modern Economy Success. Issue 1. P. 25 – 29.

Morozov I.D., Sapozhnick P.A., Pavlov S.M., Rodionova I.P. (2018). Tolerant approach in intercultural communication of students youth. Success Modern Sciences and Education. Issue 1. P. 34 – 36.

Narkevich, L.V., Narkevich, E.A. (2018). Financial condition analysis in the crisis management system. Russian Economic Bulletin. Vol. 1. Issue 4. P. 10 – 24.

Osipova M.B. (2018). Tendencies of development of educational practice of the modern educational organizations. Modern Humanities Success. Issue 1. P. 10 – 13.

Popov V.P. (2018). Methodological aspects of teaching economic disciplines in a multi-level system of education. Modern Humanities Success. Issue 3. P. 10 – 16.

Schwarzkopf N.V. (2018). Improving the use of data mining technology as a way of reducing credit risk. Russian Economic Bulletin. Vol. 1. Issue 1. P. 10 – 18.

Sergeeva M.G., Trubakova D.I. (2017). Teacher's Reflection Formation as Factor of Effectiveness Children's Social Intelligence Forming. Modern Scientist. Issue 7. P. 62 – 64.

Tsahaeva A.A., Aminov U.K., Aminova D.K. (2017). Driving forces of the development of adaptive behavior of personality: methodological considerations. Modern Scientist. Issue 8. P. 44 – 47.

Tsahaeva A.A., Aminova D.K., Aminov U.K. (2016). Patternsize value of the constructs of personality as a subject of scientific reflection. Success of Modern Science and Education. Volume 3. Issue 4. P. 16 – 20.

Zulaeva Ts. A., Maslova S.V., Appaeva Ya.B. (2018). Adaptation of students in the process of continuous educational activity. Success Modern Sciences and Education. Issue 1. P. 5 – 9.