

Development of an E-learning Environment for Educational Institutions*

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Abstract—The article deals with the key issues of creating conditions for the introduction of a modern and safe e-learning environment by 2024 to ensure that the values of self-education and self-development are formed for students of all organizations and levels by updating the information and communication infrastructure, training staff, and by creating a federal digital platform. The e-learning environment is considered as a subsystem of the socio-cultural environment, a set of specially organized pedagogical conditions for personal development, in which the infrastructural, content-methodological and communication-organizational components function on the basis of digital technologies. Developing technologies of an e-learning environment of the educational organization will allow for modernization of the educational process, introduction of e-learning in pedagogical training, models of blended learning, automation of processes of managing the quality of instruction, formation of student ability to study effectively in the digital world and create digital projects for professional career education, and enabling the presence in educational organizations on the Internet.

Keywords—*e-learning environment; information and education environment; educational organization; learning achievement; quality management; socio-cultural environment*

I. INTRODUCTION

Digitalization of all areas of society's life is an important direction of state policy in modern conditions. For the development of this area, on May 9, 2017, Decree No. 203 of the President of the Russian Federation approved the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030 [1], which defined the goals, objectives and measures to implement the domestic and foreign policy of the Russian Federation in the field of application of information and communication technologies aimed at the development of the information society, the

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formation of the national digital economy, ensuring national interests and the realization of strategic national priorities.

In order to implement the Strategy, the Digital Economy of the Russian Federation Program was approved by Resolution No. 1632-r of the Government of the Russian Federation on July 28, 2017 [2]. Due to the fact that the effective development of markets and industries (areas of activity) in the digital economy is possible only in the presence of developed platforms, technologies, institutional and infrastructural environment, one of the basic directions of the Program is defined as "staff and education".

Improving the quality of education through the development and use of information technologies is the main focus of the State Program of the Russian Federation "Information Society (2011-2020)" (Resolution of the Government of the Russian Federation of April 15, 2014 No.313) [4].

The formation of an e-learning environment in an educational organization is an urgent need, as the university has a special mission, which is to prepare a comprehensively developed graduate with the necessary set of skills and competencies, ready to function in a highly developed information society.

The e-learning environment of an educational organization implies a set of Information and Communication Technologies (ICT) tools, the use of which should have a systematic order and meets the requirements of the Federal State Organizational Standards (FSOS) for the formation of conditions for the implementation of the basic educational program of higher education, contributes to the achievement of planned personal, metasubject, subject learning outcomes by students. In addition, the e-learning environment of an educational organization should become a single communication space for all participants in educational relations, an effective tool for managing the quality of educational programs, and the work of the faculty staff [5]. Formation of the e-learning environment of the

educational organization will allow; modernization of the educational process, introduction of technologies of electronic education into pedagogical practice, models of the blended learning, automation of processes of management of quality of education, formation of student skills of proficiency in the digital world, ability to create digital projects for the future profession, and enable the presence of the educational organization on the Internet.

II. OBJECTIVES AND METHODS

The specific feature of both the modern information society and the information-educational environment (hereinafter referred to as IEE), which should conformed to this society, is that they are both based on the use of information and communication technologies. In order to achieve the educational results of a learner of the 21st century, a new educational environment is needed. It is difficult to overestimate the importance of IEE in education - its quality largely determines the success of education of students. The main criterion of the quality of the information and education environment is to provide educational opportunities to all subjects of the educational process. Therefore, within modernization of Russian education informatization is one of its priorities [6]. Such scientists as O.N. Luchko, M.I. Bocharov, E.V. Tanova, O.N. Arefiev were engaged in the problems of ICT use in the management and administration of the educational institution. Amerongen, Stichting Kennisnet, Kurova N.N., problems of using telecommunication networks in training - Bukharkina M.Y., Moiseeva M.V., Polat E.S., Uvarov A.Y., problems of creating and using e-learning resources, electronic textbooks and virtual environments — Grab V.P, Grigoriev S.G., Grinshkun V.V., Lazareva I.A., Osin A.V., Uvarov A.Y., Krasilnikova V.A., Vedeneev P.V., Zavarihin A.S, Kazarina T.N. Zenkina S.V., Prozorova Y.A., Bashmakov M.I., Mashbits E.I., Rakitina E.A., Robert I.V., Kozma R.B.

III. RESULTS AND DISCUSSION

A fast-growing market for educational services outside the traditional education system is emerging, which may in the short term reduce the scope of these systems, and lead to

the creation of new educational models that meet the emerging and rapidly changing needs of consumers. A significant part of innovations in education is already being implemented through educational and technological start-ups, the demand for new competencies and forms of training is growing, provoked by the dynamics of economic development and rapid change of technologies. As a result, a new type of learner has emerged, forming their own educational trajectory, aimed at self-education, self-actualization and self-development, combining learning, work, and personal development.

Nowadays the regional education system is faced with the task of building a new type of educational environment - e-learning environment, which involves all the participants of the educational process: the administration of educational organizations, teachers and students, their parents, municipal education authorities and social partners. The e-learning environment is designed to expand the possibilities of organizational forms and methods of education through digital services and resources (shift of paradigms of education to online and hybrid models, the spread of Bring Your Own Device (BYOD) approach (the use of students' own mobile devices), and the use of cloud technologies, are contributing to the greatest effect of the use of information and communication technologies in the educational process. In modern conditions, the projected information-educational environment will be able to provide the necessary social, economic and, of course, pedagogical effect, if the created and implemented information technologies will not become a foreign element in the traditional system of professional education, but will be naturally integrated [7].

The digital system can lead to a common denominator for all interested persons in an advanced educational environment. In its turn, such coordination is guaranteed to ensure economic growth and development of the state. This means that the interest in the formation of a modern e-learning environment is dictated by time and state necessity. In the process of forming the e-learning environment of an educational organization, several stages can be identified ("Table I")

TABLE I. STAGES OF FORMATION OF AN E-LEARNING ENVIRONMENT OF AN EDUCATIONAL ORGANIZATION [8]

Stages	Justification
Stage I. Organizational stage	Conformity of the existing material and technical base with the requirements of FSES is assessed. Planning of replenishment of material and technical base. Planning the training of the school staff. Analysis of ICT level - competence of teachers. Development of local acts. Choice of software for the formation of an e-learning environment most suitable for these conditions.
Stage II E-learning Environment formation stage	Creation of the service of methodical and technical support of the e-learning. Formation of material and technical base. Personnel training. Formation of a single information space at school. Ensuring information security in the school's information security center Involvement of parents and students in work with separate components of the e-learning environment in school.
Stage III. Analytical stage	Assessment of compliance of the e-learning environment formed with the requirements of Federal State Educational Standards. Introduction of changes in planning of e-learning environment formation.

A number of key aspects should be taken into account in the development of an e-learning environment in an educational institution ("Fig. 1"):

- The level of ICT competencies of teachers of the educational organization;
- Possibilities of introducing information and communication technologies in the practice of teaching all subjects of study;
- Possibilities of introducing information and communication technologies into the activities of the educational service of an educational organization;

- Educational organization and support services;
- Provision of the educational organization with the necessary equipment;
- Conditions for practical application of computer equipment and other digital tools by all participants in educational relations;
- Possibility of open access to information channels of the local internal network, Internet global network and media centers;
- Continuous development of the technical infrastructure of the e-learning environment.

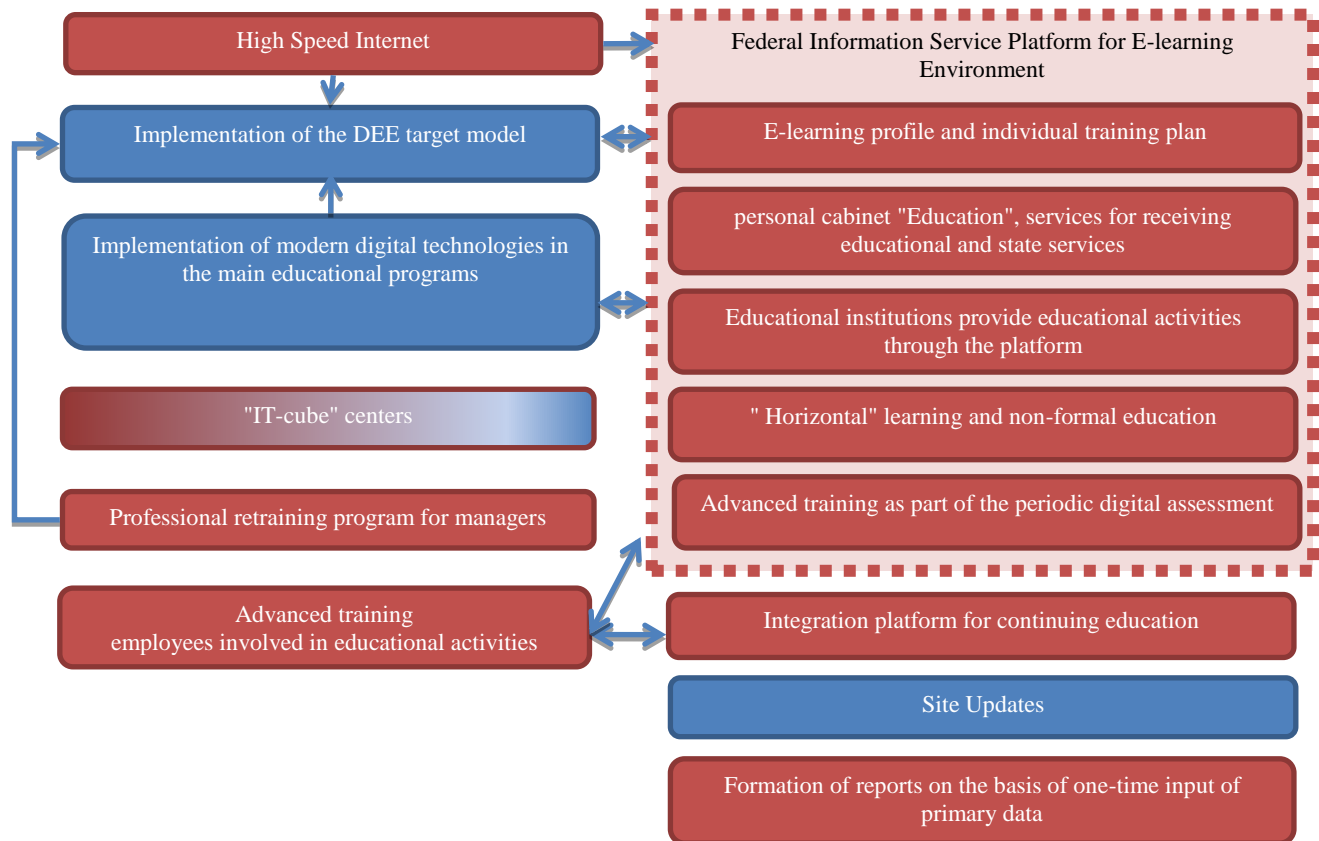


Fig. 1. E-learning environment.

In modern conditions, the objects of monitoring in the educational process are the results, personal characteristics of all participants in the educational process, their needs and attitude to the educational institution.

Building an effective environment is a key condition for effective digital education. The environment should meet the objectives of the digital society, to create conditions for a wide choice of educational requests, for its flexible correction in the formation of an individual educational trajectory as needed. The environment should offer a variety of tools: [7]

- For self-study and/or with the help of a mentor,
- For rapid and positive feedback,

- For wide interpersonal cooperation without age barriers.

Building such an environment is impossible in the logic of strict standards and centralized restrictions. The dynamics of modern society requires open competition. Open competition requires simple contour rules for the inclusion of new educational products and services in the digital environment and the withdrawal of old ones from it. Restrictions should be minimal and only in those situations without which risks are too high.

A key tool for forming an environment as an open ecosystem is standards for data exchange protocols between different information systems within it. Flexibility and openness of modern digital technologies should provide an

opportunity for each student to form his or her own environment to support his or her individual educational trajectory, namely to conveniently combine the capabilities of the environments of different educational institutions, rather than forcing them to switch between them.

IV. CONCLUSION

The target model of the e-learning environment is a model of complex functioning of key components of a modern and safe e-learning environment in order to ensure high quality and accessibility of education of all types and

levels ("Fig. 2"). The current processes of transformation of IT, infrastructures, the increasing level of Internet penetration and the rapid spread of mobile devices cause the emergence of an increasing number of new educational applications and innovative learning technologies.

IT solutions being developed and implemented focus on supporting more creative and innovative learning methods, as well as a more visible return on investment. Technologies can reduce costs in the education system; in particular, this is the focus of initiatives to create e-textbooks, develop distance learning, and use open data [8].

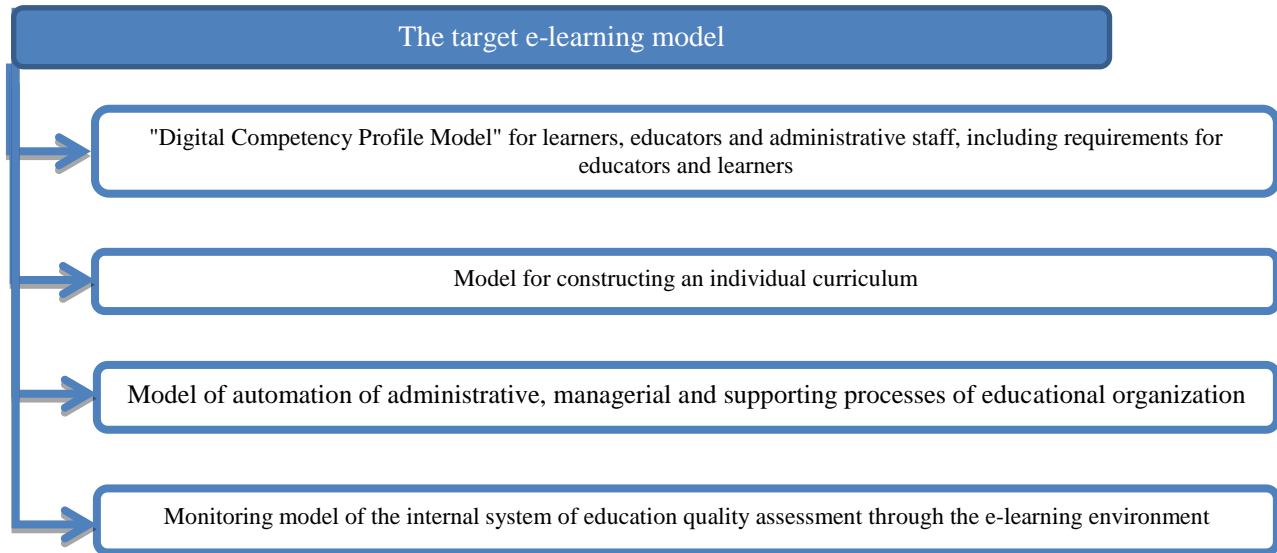


Fig. 2. Implementation of the digital educational environment target model.

In modern conditions the objects of digital education environment monitoring are the educational process and its results, personal characteristics of all participants of the educational process, their needs and attitude to the educational institution. The information collected in the course of monitoring should provide the educator or supervisor with the necessary and sufficient data to select an adequate model of training or management.

A set of methods is recommended for monitoring. This provides a holistic view of the state of the of the education system. Key indicators for monitoring an education program now include:

- Effective management of the educational organization using modern digital tools, modern financing mechanisms;
- Information and library centers with working areas equipped with reading rooms and book depositories, ensuring the preservation of the book collection, and a media library;
- Placement of products of cognitive, educational and research and project activities of students in the information and education environment of an educational institution;

- Design and organization of individual and group activities, organization of their time using ICT;
- Planning the educational process, recording its implementation as a whole and individual stages (speeches, discussions, experiments);
- Providing access to information resources of the Internet, educational and fiction literature, collections of media resources on electronic media, multiplying techniques for replication of educational and methodological textual, graphic and audio-visual materials, results of creative, research and project activities of students in the school library;
- Planning the educational process, recording its dynamics, intermediate and final results.

As a result, the global movement of education systems towards data and content openness reflects a growing trend of increasing efficiency in the use of a wide range of information. This not only addresses the issue of reducing the cost of access to traditional resources, but also the problem of lack of educational resources (and even teachers) in some regions. In a number of countries, such open initiatives are actively supported by the authorities and are considered strategic.

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