Aspects of Information Support of the Learning Process

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Abstract— The article discusses the problem of using information technologies in education, provides examples of using information technologies in education. The significance of the introduction and use of information technologies in Russian society and Russian education is analyzed. It was revealed that information technologies in education allow the use of a wider range of forms and methods of teaching and are one of the modern ways of intensifying and optimizing the educational process.

Keywords— information technology, education system, new educational technologies.

I. INTRODUCTION

In the present post-industrial society, the role of information technologies (IT) is extremely important; today they occupy a central place in the process of intellectualization of society, the development of its educational and cultural systems. Their widespread use in various spheres of human activity dictates the expediency of the earliest possible familiarization with them, starting from the early stages of learning and cognition. The education system and science are one of the objects of the process of informatization of society. Informatization of education, due to the specifics of the very process of transferring knowledge, requires careful testing of the used (informatization technologies) and the possibility of their wide replication. In addition, the desire to actively apply modern information technologies in the field of education should be aimed at improving the level and quality of training of specialists. "Testing" of IT used in the field of education should set as its goal the implementation of the following tasks:

support and development of the consistency of thinking of the student;

support of all types of human cognitive activity in the acquisition of knowledge, development and consolidation of skills and abilities;

implementation of the principle of individualization of the educational process while maintaining its integrity.

Therefore, it is not enough just to master this or that information technology. It is necessary to highlight and most effectively use those features and capabilities that can to some extent ensure the solution of the above tasks. For a number of years, information technologies in the field of higher education have been developing, inter alia, within the framework of R&D on interuniversity scientific and technical programs "Informatization of higher education" and "Advanced information technologies in higher education". Basically, R&D was supported on the so-called basic and applied technologies of informatization. Ultimately, all the advances in the application of information technologies in the field of education, the creation of telecommunication networks and support of information flows in them, the creation and maintenance of data banks and knowledge bases, expert systems and other types of IT should serve one goal - the development of a methodological basis for the application of information technologies in the process of education and training. In essence, at present, society is facing the task of learning how to correctly, optimally and harmlessly use a computer in the entire education system as a whole [1-3, 5].

II. LITERATURE REVIEW AND PROBLEM STATEMENT

The active policy of manufacturers of computer hardware and software, especially in the clone of personal computers, as well as companies providing telecommunications services has led to the fact that a person in the modern information society can no longer do without a computer. However, most users cannot answer a fairly simple question: "What new and necessary things have computer technologies brought into his life?" Only one thing is obvious - just the use of these technologies requires large material costs.

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (E-ISSN 2250-2459, Scopus Indexed, ISO 9001:2008 Certified Journal, Volume 11, Issue 10, October 2021)

But why should they be used, how to realize the new opportunities provided by these technologies, and, most importantly in the field of education, how to effectively use new technologies in education and training?

Even specialists in the field of education in developed countries today cannot unequivocally answer these questions and assess the consequences of the use of computers and information technologies in the field of education. This is despite the fact that their education system uses computers much longer and more efficiently than ours. Experts from all over the world unanimously state only one thing - the use of a computer in this area of human activity has generated more problems than it has solved. Here we are talking about the process associated with the use of information technology in teaching as such, and not about the organization and support of the educational process.

The main problems arising in this case are:

- how to redesign the curriculum for its computerization;
- how to build an educational process using a computer;
- what proportion of educational material and in what form to present and implement using a computer;
- how and by what means to control knowledge, assess the level of consolidation of skills and abilities;
- what information technologies to use for the implementation of the set pedagogical and didactic tasks [1-3, 7].

To transfer the course to the computer technology of teaching, the teacher who sets the course must have an idea not only about the subject area, but also be a good methodologist, have the skills to systematize knowledge, be well informed about the possibilities of information technology, and also know by what means of computer support one or a different didactic device. In addition, he must be informed about those technical means and software that will be available to him both when creating applied software (software), and when accompanying the educational process. Obviously, one person cannot do this.

A computer as a learning tool can only be used if the appropriate software is available. The use of IT in education and training ultimately lies in the development and use of educational software.

The peculiarity of this type of software product is that it must accumulate, along with the computer program as such, the didactic and methodological experience of the subject teacher, the relevance and correctness of information content for a particular academic discipline, and also meet the requirements of the educational standard and implement, at the same time, the possibility of its application both for independent work of the student and in the educational process.

The education system creates a huge amount of software to support the educational process. These can be databases (DB), traditional information and reference systems, repositories (depositories) of information of any kind (including graphics and video), computer training programs, as well as programs that allow the administration of the educational process.

The modern stage of using computer technology of teaching in the educational process consists in using a computer as a means of teaching, not episodically, but systematically from the first to the last lesson in any type of training. The main problem in this case is the methodology of computerization of the course, which is to be mastered by the trainee. Either a complete restructuring and orientation towards the creation of new computerized courses is possible, or the implementation of the methodology with partial computer support of the course. In other words, we are talking about the form of computer support for the learning process. Currently, the practice of using computer technologies in education reveals two trends [5,6]:

- application of industrial universal computer programs designed to solve a wide range of practical and scientific problems from various subject areas, and adapted to academic disciplines;

- the use of training programs specially designed for training purposes and implementing the appropriate methods laid down in them by the developers.

Today, there is a wide range of programs from the simplest, controlling to complex multimedia products.

In the modern slang of software specialists, the term "application" means any application software created by users to implement their "corporate" tasks.

International Journal of Emerging Technology and Advanced Engineering

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Creation of educational applications in accordance with modern requirements even with the help of instrumental systems by individual teachers and small creative teams does not give the desired results, since creating a high-quality product requires the participation of specialists from various fields of information technology. Therefore, for their production, it is necessary to organize stable technological chains (publishing laboratories). These laboratories should include the following specialists:

- project manager for creating an application;
- a project designer who ensures the unity of design tools and the general structure of the application;
- a computer artist preparing graphic illustrations and animation fragments;
- application installers who know how to work with software development tools;
- subject area consultants independent of the subject scenario developer;
- technical editors and proofreaders who know how to work in the field of information technology;
- sound design specialist who records sound (speech, music, noise) fragments, their editing and installation;
- a computer video image processing specialist who knows how to work with hardware and software for inputting, processing and integrating video into a software product [7, 11].

Of course, the basis for the implementation of such software is a script prepared by the teacher for computer support of the course, which provides information, didactic and methodological components of the course.

With sufficient qualifications in the field of new information technologies, the ability to work on a computer with applied systems and in the presence of the original version of the training program, as well as libraries of typical graphic fragments prepared by specialists to provide the general direction of design and libraries of fragments of training material, modification of a specific training program (while saving high quality of the original product) will be within the power of individual teachers and small creative teams. The purpose of the modification is to create computerized courses to ensure their personalization and customization for each student [10, 12, 13].

Now there is a tendency in which commercial firms, having invested huge funds in the technological chains of multimedia CD-ROM development, fill the market for educational and, in some cases, educational software products, about which teachers and teachers in schools are poorly or generally uninformed. Schoolchildren and students, having acquired them, can use them. But whether such a “computer textbook” corresponds to the program of a certain subject or course, as well as how to apply it in the educational process conducted in a particular educational institution, often neither the head teacher, nor the director of the educational institution, nor, even more so, the teacher knows. They perceive, as a means of supporting the educational process, only that educational software that is developed by them, or tested and recommended by colleagues. However, professional teachers and methodologists do not have such technical capabilities as commercial firms do to create software that is necessary and useful, from their point of view, to the learning process.

Therefore, we need a system for the development of computerized courses, supported by the state, for computer technology of education and, in parallel with it, a system for training and retraining of teaching personnel who can use information technology to implement computer technology of education.

III. MATERIALS AND RESEARCH METHODS

With the advent of the possibility of communication between educational institutions through telecommunication networks, servers are created and function in the education system, presented by their creators as servers for educational purposes. They usually contain several information pages, implemented in the HTML language. It is almost impossible to use these materials directly for the learning process [9].

The forecast of experts of the European community on the prospects for the development of telematic systems (systems that, along with the telecommunications infrastructure, implement a subject-oriented information component) at the end of the 90s of the XX and the beginning of the XXI century includes, among other priority areas of their use, the following:

International Journal of Emerging Technology and Advanced Engineering

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adaptation of existing educational applications for their wide use in telematic systems of the present and future;

personification of educational and training computer programs;

integration of training systems into personal workstations, both local and networked;

development of new forms of education associated with the use of learning environments ("microworlds");

providing remote multimedia access over networks to libraries and other sources of information from personal multimedia workstations.

Creation of applications for educational and educational purposes is a very laborious process, and their installation in networks entails additional problems associated with the conditions of their distribution. Currently, the foundations of methodologies for the development, distribution and use of such applications are being formed. However, this is only a small part of the many other problems associated with the development and distribution of educational applications. Nobody is involved in their complex solution in Russia.

The world community pays great attention to the discussion of approaches to solving these problems. Conferences, seminars and other events are held to exchange experience in the use of computer learning technology in the real educational process, where the positive and negative aspects of informatization of education are assessed (in particular, the World Conference on Educational Multimedia and Hypermedia under the patronage of the AACE association). The usefulness of such conferences for specialists from Russia lies in the fact that they present and discuss the results of certain educational and training projects using various possibilities of information technologies. It is impossible to carry out so many educational and training experiments and evaluate their results in one, taken separately, education system. All the more so if these experiments were carried out using the developed infrastructures of Western countries. The high cost of conducting educational experiments using the capabilities of advanced information technologies puts our teachers and specialists-researchers of these problems in a very difficult position. Hence the fragmentation, and the lack of a systematic approach to the implementation of at least the foundations of computer technology of education, the impossibility of replicating the successful results of educational projects, and simply replicating individual computerized courses in other educational institutions.

Specialists who have decided to seriously tackle these problems can be recommended, in particular, the International Journal of Educational Telecommunications, information about which is also posted on its web server www.aace.org.

One of the approaches to solving the creation and distribution of educational applications in telecommunication networks in Russia is the adaptation of the educational software product already existing in the system of general and professional education to the peculiarities of telematic systems.

Adaptation of software consists primarily in the fact that it must be open for modification and maintenance, perceived and supported by the corresponding browsers. As for the methodological aspects, it (this software) must be carefully edited, informationally verified and support the principle of personification and dispensing of educational material. Along with these issues, it is necessary to solve the problems of copyright, the right to use the application by educational institutions, as well as to implement various ways of accessing and distributing it in networks.

If we talk about the state of affairs with the use of information technologies in our country, then, despite the economic difficulties and the lack of adequate funding (IT costs per capita in 1997 in Russia - US \$ 14, in the USA - US \$ 1095, in Germany - 613 \$ US), in the education system there is an active development of information technologies and no less active attempts to apply them in educational and educational processes. The brake here is the lack of a systematic approach to solving the whole complex of problems mentioned above.

If we evaluate the resources and opportunities for the creation and distribution of educational software for the educational system of Russia, then now the most effective way to do this is to analyze the information and evaluate the software that is declared or posted on the servers of leading educational institutions. However, this will be for informational purposes only.

For the purposeful use of the enormous potential and experience in the creation of software for educational and educational purposes, as well as the coordination of work carried out in the education system on the active use of IT, it is necessary to revive the practice of selecting on a competitive basis the best software for educational and educational purposes that has been tested in the educational process of educational institutions with the aim of distributing it in the education system.

International Journal of Emerging Technology and Advanced Engineering

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For an objective assessment of the quality of educational software being developed, there are certain indicators and criteria, which, in turn, also require constant improvement and adjustment. Our experience in this area shows that it is possible to create an educational software product necessary and useful for the education system only on the basis of attracting representatives of at least several scientific and pedagogical schools in each subject area to cooperation, and the implementation of this project should be carried out on the basis of a state order, the requirements for which and the ways of implementation of which have been worked out.

The initial stage of the implementation of a systematic approach to the use of IT in education and training is associated, first of all, with the implementation of the following proposals:

creation of an educational and methodological center on the problems of developing methods of computer technology for teaching, technologies for developing software for educational purposes and educational applications for telematic systems;

development of a system of indicators for assessing the quality of educational software;

development of organizational and legal norms (principles) for the creation and use of educational applications for their installation in telematic systems.

The implementation of these proposals does not require the creation of another institution in the education system. The functions of the center can be integrated by the parent organization according to the corresponding subprogram within the framework of the interuniversity program "Information Technologies", which will coordinate the activities and generalize the experience of those organizations and institutions where research is being conducted in this direction.

IV. CONCLUSIONS

In order for the education system to be ready to accept the challenges of the 21st century, certain system transformations are required based on the use of modern information technologies. The main hopes are pinned on the creation and maintenance of information and educational environments (IES) for open and distance learning, on the development of new object technologies for creating databases of educational materials (BUM), along with the development of traditional technologies for the development of electronic textbooks and multi-agent technologies for educational portals.

So, information technology and education - these two trends taken together are becoming those spheres of human interests and activities that mark the era of the XXI century and should become the basis for solving the problems facing humanity.

In the light of the above, a new promising subject area begins to form - "Information Technologies in Education". This area includes the problems of intelligent learning systems, open education, distance learning, information educational environments. This area is closely related, on the one hand, with pedagogical and psychological problems; on the other hand, with the results achieved in such scientific and technical areas as telecommunication technologies and networks; computer systems for processing, visualizing information and interacting with a person; artificial intelligence; automated systems for modeling complex processes; automated decision-making systems, structural synthesis and many others.

REFERENCES

- [1] Corral, S. 1998. Key skills for students in higher education. *SCONUL Newsletter*, 15, 25-29.
- [2] Iasechko M., Larin V., Ochkurenko O., Salkutsan S., Mikhailova L. and Kozak O. 2019. Formalized Model Descriptions Of Modified Solid-State Plasma-Like Materials To Protect Radio-Electronic Means From The Effects Of Electromagnetic Radiation, *IATCSE*, 8(3), pp. 393-398. doi:10.30534/ijatcse/2019/09832019.
- [3] Masoni M., Guelfi M. R., Conti A., Gensini G. F. 2011. Knowledge management e-learning in ambito sanitario., Milan. Springer, pp 65-72.
- [4] Iasechko, M., Iasechko, S., Smyrnova, I. 2021 Aspectos pedagógicos do autodesenvolvimento de alunos de educação a distância na Ucrânia. *Laplace Em Revista*, 7(Extra-B), p.316-323.
- [5] Meera N. S. 2015. Quality education for all? A case study of a New Delhi government school, *Policy futures in education*, № 13 (3), pp. 360-374.
- [6] Biddiscombe, R. 1999. Developing the learning support role: Some of the challenges ahead. *SCONUL Newsletter*, 16, 30-34.
- [7] Mason, R. 1998. *Globalising Education: Trends and Applications*. London: Routledge, P. 37.
- [8] Alfred P. Rovai, Linda D. 2004. Grooms The relationship of personalitybased learning style preferences and learning among online graduate students. *Journal of Computing in Higher Education*. №16, Issue 1. pp 30- 47.
- [9] Santo-Sabato Andrea, Vernaleone Marta. 2014. From the First Generation of Distance Learning to Personal Learning Environments: An Overall Look. *E-Learning, E-Education, and Online Training*. №138. pp. 155-158.
- [10] Iasechko M., Chimshir V., Kaliakin S., Grischenko O., Minko N., Palagin O. 2020. Space-Phase-Frequency Control of Signals in Means of Generating Electromagnetic Radiation, *IATCSE*, 9(5), pp. 8575-8579. doi: 10.30534/ijatcse/2020/239952020.

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (E-ISSN 2250-2459, Scopus Indexed, ISO 9001:2008 Certified Journal, Volume 11, Issue 10, October 2021)

- [11] Iasechko M., Tymochko O., Kolodiazhnyi O., Larin V., Rybkin O., Patalakha V., Mazharov V., Benyk N., Heilyk A., Mozhaiev M. 2020. Estimation of the influence of the Nonequilibrium State of the Electronic Subsystem and the Dispersion Properties of a Solid-State Plasma Medium in the conditions of Decay Instability on the reflection of Laser Radiation, *IJETER*, 8(2), pp. 568-573. doi: 10.30534/ijeter/2020/47822020
- [12] Iasechko M., Tymochko O., Shapran Y., Trofymenko I., Maksuta D., and Sytnyk Y. 2019. Loss definition of charged particles in the discharge gap of the opening of the box-screens during the formation of a highly conductive channel, *IJATCSE*. 8(1.3), pp. 1-9. doi: 10.30534/ijatcse/2019/0181.32019.
- [13] Shapiro, J., & Hughes, S. K. 1996. Information literacy as a liberal art: Enlightenment proposals for a new curriculum. *EDUCOM Review*, 31(2), 31-35.