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## INTERNET-BASED TECHNOLOGIES

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### **Electronic Library “Moscow Electronic School” as an Effective Didactic and Methodological Resource for Learning**

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**Abstract.** Currently, one can observe active use of electronic resources by teachers at various teaching stages, on all levels of basic education. In this work, the authors review an electronic library available on the “Moscow Electronic School” website. The article reveals the potential of using electronic network resources of the Moscow Electronic School project for the self-development of students, provides examples of the use of such resources in the educational process, gives a brief overview of scientific literature on this topic, describes the results of experi-

ence with the electronic library. It all allows the authors to talk about the efficiency of using such resources, both in Russia and abroad, namely, to state an increase in the level of activity and the quality of educational material assimilation. Electronic libraries are of great importance to the interactive learning process. As another result of the study, the authors note an increase in the level of educational motivation. Thus, we can say that the resources of modern electronic libraries offer a significant potential for the development of necessary skills, abilities and knowledge in students.

**Keywords:** interactive teaching methods, Moscow electronic school, electronic library resources, educational motivation, digital educational environment, electronic resources, electronic libraries

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Modern teaching methods and technologies are directly influenced by scientific and technical innovations, as well as the technological upgrade of the educational process. Recent advances in high technology and the spread of the global Internet open up unlimited opportunities for teachers to further improve the educational process. Internet resources are one of the most desired modern educational tools that contribute to building various knowledge, skills, and abilities in students [1, 2]. And here the question of the legitimacy and reliability of the Internet resources used becomes extremely important. The relevance of the problem we study is due to the fact that in the conditions of education digitalization, first, we need to implement new methods and technologies for teaching pupils with special attention given to the network interaction of all participants in the educational process; second, to promote the formation of students cognitive interests in accordance with educational modules offered by the school, and third, provide new sources of information – electronic (not digital) textbooks and electronic libraries and other network resources [3, 4]. The question arises – what are these new sources of information? Electronic textbooks have been talked about for a

long time, yet they remain at the development stage, while new electronic resources are already being created and their content and its presentation, which corresponds to the peculiarities of thinking, perception and assimilation of information by generation Z is their inherent feature.

Recently, especially after the introduction into the pedagogical practice of hybrid teaching, that is, a combination of traditional teaching methods with remote education, network resources, interactive teaching methods and technologies have proven their relevance and effectiveness. Let's consider this by the example of the modern electronic resource "Moscow Electronic Library" (MES).

The methodological principles of organizing the educational process and mastering general education programs based on the use of information technologies are as follows: the principle of interactivity, which is expressed in constant contacts of all participants in training through the use of educational and methodological environment, including the Internet; the principle of adaptability, which makes it easy to use educational materials of a new generation, containing digital and electronic educational resources in specific conditions of the educational process; the principle of flexibility, which enables all participants in the educational process to work at the pace they require; the principle of modularity, which allows the student and the teacher to use the necessary training courses for the implementation of individual curricula; the principle of scientific validity, consistency and reliability of the information used [5]. Thus, the approach to the formation of both personal libraries of teachers and students and school and other academic libraries is changing: library collections must include electronic, multimedia, network resources and electronic teaching tools. It is worth noting that a survey of school library staff shows that patrons have recently become more and more active in the use of online resources, including electronic libraries.

In accordance with the standard GOST 7.0.96-2016 "Electronic Libraries", an electronic library (EL) is understood as an information system designed to organize and store an ordered collection of electronic objects and provide access to them using unified navigation and search tools [6]. An EL stores digital documents, metadata, hyperlinks.

Most often, an electronic library is a website where digital text files of books, textbooks, etc., presentations, as well as photo and video files are accumulated, each of which is self-sufficient and can be used by users at any time [7–9]. The so-called "advanced" network websites have been provided with hyperlinks, which greatly increases the digestibility of the material. Another advantage of EL is that since childhood they teach students to use not any Internet resources but reliable information from the websites of libraries, scientific and state centers and institutions, compiled and edited by professionals and specialists, not bloggers.

As we noted above, in recent years electronic libraries have become increasingly popular and widely used at all levels of the lifelong learning process, as there is an urgent need for the fastest and most inexpensive ways to generate and transfer knowledge. This process has been caused by the incredibly rapid development of science and technology and leads to a total computerization of society, including the entire learning process. As a consequence of this process, there is a demand for network resources, in particular EL, and not only by teachers, but also by students. Electronic libraries are equipped with multidimensional search and navigation systems, which, on the one hand, saves a significant amount of time when searching for information, on the other hand, it contributes to the expansion and saturation of search content, an attractive feature for students, since it takes much less time to find relevant information compared with general Internet search. As a result, more free time is left for individual self-development as well as the development and formation of motivation for acquiring new knowledge and self-improvement.

The Moscow Electronic School (MES) is a completely new system that combines the advantages of traditional education and modern digital technologies, which makes it possible to introduce completely new teaching ways and methods into the pedagogical process [10]. The MES concept is being created and supported by Moscow teachers of all disciplines. The MES content includes the following materials and documents:

1. Textbooks and teaching aids on various subjects, laboratory workshop materials, problem books, tests, control questions, lecture notes, etc.
2. Educational and methodical kit. In electronic form, you can pick up curricula, methodological instructions, lesson plans, and programs.

3. Reference materials. For example, dictionaries, databases, reference books, encyclopedias are offered in the form of EER.

4. Regulations and legal acts, national pedagogical standard, job descriptions.

5. Art publications, anthologies, promotional materials and scientific publications.

6. Demonstration, illustrative kit. This includes visual aids, atlases, visual maps, albums.

7. Periodic publications, including scientific, popular science, mass political, leisure, reference, art, production and practical [11, 12].

8. In the MES, teachers can upload their works of authorship: illustrative materials, presentations, sets of animations and slides, audio and video used in class, lesson scripts, lectures, presentations, test assignments, various audio and video materials for a range of disciplines of the school curriculum and beyond.

The resources of the new generation digital libraries with open access via the Internet can be used both as supplements to the traditional materials of the curriculum, and as an independent resource for self-education [13].

In our work, we explored the effect of MES use on study motivation among the students of the Moscow State Budgetary Educational Institution "School No. 1191". To identify the levels and types of student motivation, we used the methodology developed by I. S. Dombrovskaya based on the works of A. S. Gerasimova, A. K. Markova and L. I. Bozovic [14, 15]. The authors consider study motivation as a combination of cognitive and social motivation of students. The cognitive type of motivation includes the cognitive interests of students, the need for intellectual development and the acquisition of new skills and knowledge [16]. The social type of motivation for learning includes the need to communicate with other people, the need for assessment and approval, the desire of students to take a certain place in the system of social relations available to them [17, 18].

The study involved 108 students, aged 14 to 17 years, who were tested according to this method at the beginning and end of the study. At the ascertaining stage of the study, students in grades 10 and 11 were divided into control and experimental groups. The control group included

students of classes 10a and 11a, the experimental group included classes 10b and 11b. The number of students in the control group is 52, in the experimental group, 56. Gender and age composition of the groups, as well as academic performance in the groups, do not differ. At the ascertaining stage of the experiment, the groups were tested according to the method of I. S. Dombrovskaya to determine cognitive and social motivation. The study showed that at the beginning of the experiment, the levels of cognitive and social motivation in the control and experimental groups differed only slightly. At the formative stage of the experiment, classes with the experimental group were conducted using the MES materials. At the same time, the “flipped class” technique was also used when students studied new material with the help of MES resources, and followed it up in the classroom with the teacher. In the control group, classes were conducted using traditional teaching methods. At the control stage of the experiment, the groups underwent a second test according to the method of I. S. Dombrovskaya. In the control group, students showed results that did not differ from the ascertaining stage. The results of the study in the experimental group are shown in Fig. 1.

The data presented in the diagram indicate that during the study and use of the resources of the MES electronic library, there was a shift in the indicators of educational motivation of students. The number of students with an average and high level of cognitive motivation increased by 11% and 7%, respectively. The number of students with an average and high level of social type of motivation also increased by 14% and 6%. These indicators show a positive effect of electronic library usage on educational motivation.

Electronic educational resources allow the teacher to rationally organize the educational process, as well as increase the effectiveness of the lesson. Electronic libraries form the skills and abilities for independent work with various sources of information, help build up the information culture of the individual, which is necessary in the future life of any person. Since school years students already understand what information noise and information garbage are, develop skills of working with various information resources including resources of various libraries, incl. international ones, and thanks to this, students develop a new culture of educational activity, the need for new and new knowledge, and, consequently, for continuous education and strive for knowledge.

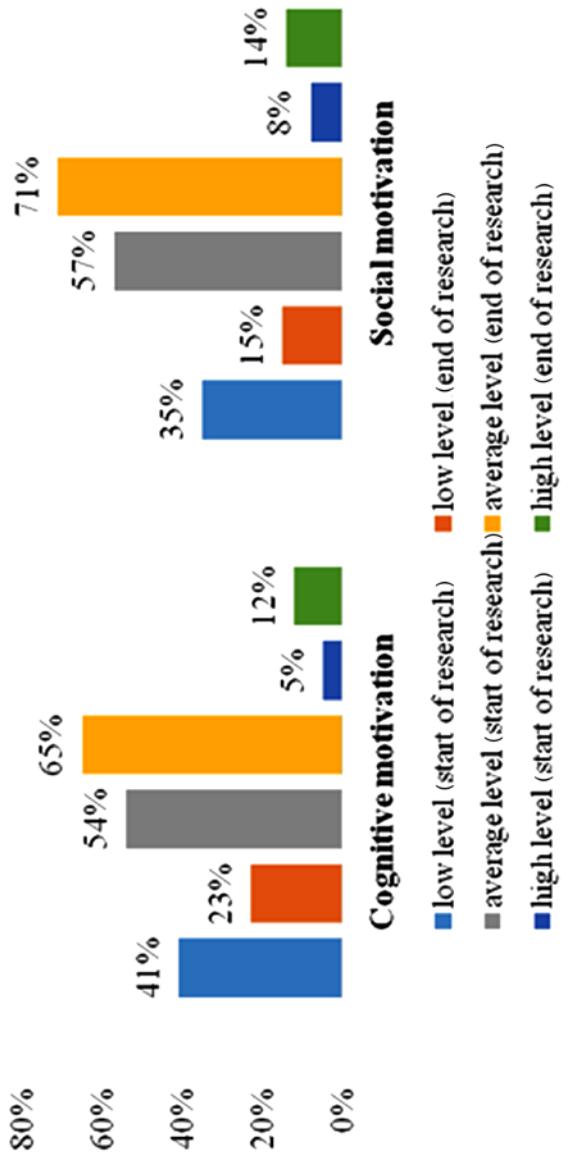


Fig. 1. Levels and types of educational motivation of students in experimental group at the initial and final stages of research according to the method of I. S. Dombrovskaya (Compiled by the authors)

Depending on the technical equipment of the educational institution, the teacher or student chooses a group of resources of the electronic library. But the basis for the choice of EL resources rests on the classical principles of pedagogy as follows [19, 20]:

1. The principle of clarity: the use of illustrative material, audio material, rare illustrations, interactive presentations in any lesson, reducing the learning time and freeing up the resources of children's health.

2. The principle of accessibility: this technology is integrated with the technology of differentiated teaching and allows simultaneous display of multilevel tasks, control and test tasks, tasks of increased complexity on a monitor or screen.

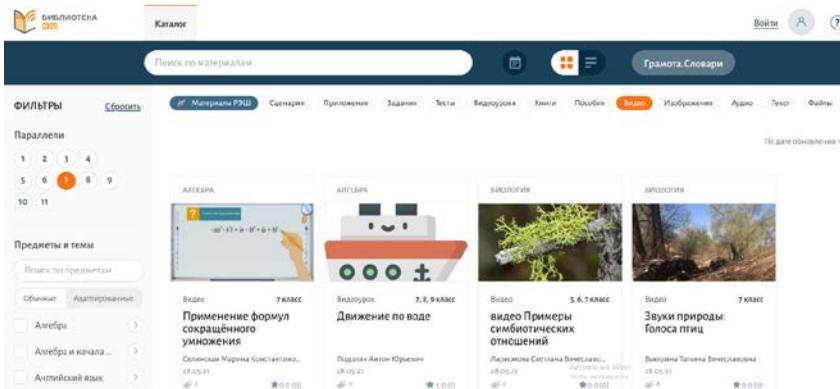
3. The principle of strength: the use of training programs allows students to recall the material of previous lessons in a future lesson, and to return repeatedly to the studied material.

4. The principle of systematic approach: the use of presentations allows one to develop a system of lessons on one topic, as well as display the elements of previous lessons to explain new things.

5. Scientific principle: the transformation of this principle in multimedia learning gets a more fundamental basis.

6. The principle of consistency: as in traditional lessons, the teaching material is memorized in greater volume and more firmly.

Using electronic scripts of lessons from the MES, teachers can make their lessons more interesting and productive [21] so that no student remains indifferent. It is assumed that the teacher starts the lesson from their computer or tablet. The board displays general information for the entire class (Fig. 2). On the teacher's tablet, "Screen 2" is open, it contains the stages of the lesson, additional questions and comments for each exercise. Screen 3 is the student's screen. Students use their gadgets to perform both group assignments and individual assignments. The teacher evaluates the results of the completed assignments and puts marks in the "Electronic Diary".



**Fig. 2. MES electronic library.**

**Source – website <https://uchebnik.mos.ru/>**

Students can find additional fiction literature in the “Books” section of the EL MES. It is very convenient. After all, there is no need to go to the library and pick up necessary books there, and after a while go to the library again to return the books. In the MES Library, students can return to their favorite works time and again at any time.

EL resources are used in class at various stages of the lesson. Videos and presentations can be used at the motivational-target stage. At the cognitive stage, it is possible to include the presentation of the material by the teacher in the form of a survey, video lesson, visual and illustrative material, for example, viewing static or dynamic images on screens of reflected glow, interactive whiteboards, computers. The practical stage can include various exercises, computer simulators, for example, working with images on a computer or an individual interactive whiteboard. At the control stage, such types of electronic educational resources as computer tests, electronic verification papers, test tasks, exercises for preparing for the final certification can be used.

Do not forget that excessive use of interactive electronic educational resources can lead to a number of difficulties [22, 23]:

- the need for constant update of computer technology capable of supporting the requirements of new electronic educational resources;
- additional load on both students and teachers.

The main negative factor in using electronic resources as a self-learning tool is the difficulty in generating interest, motivation and understanding. Students need to be properly guided by the instructions of teachers in order to use the resources of electronic libraries in their educational process. Thus, the potential of e-library resources must be harnessed through proper guidance and assistance to learners.

Conclusions. The resources of modern electronic science have a high didactic and methodological potential in teaching students and in the formation of the necessary skills and abilities. Thanks to EL of a new generation, the motivation of students to carry out practical, laboratory work is increased, cognitive activity is stimulated, and involvement in educational activities grows. The use of electronic libraries makes it possible to conduct lessons at a high aesthetic and emotional level through the use of clip presentation of material, music and animation. The volume of work performed by students increases by one and a half to two times. EL contribute to the development of individual's information culture.

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