

Potential of State Information Systems in Assessing the Quality of Education*

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Abstract. The analysis of the trends in the educational policy of the state and the Federal State Educational Standard requirements for the modern school has led to the necessity of introducing the “Digital School” model of the educational information environment, which will combine new information and communication technologies and educational practices in the educational process, as well as ensure their effective use in the educational process. The issues of managing educational activities of students, the use of new methods, organizational forms, and teaching digital resources based on developing modern information technologies are becoming the most relevant. The conditions for the organization of the educational process are substantially changing following the development of the information educational environment of the educational institution. Modern learning tools using cloud computing, virtual laboratories, artificial intelligence, social services, robotics, digital educational resources, and others are changing the requirements for the educational environment and the organization of the learning process. At the same time, the issue of the effectiveness of using the methods of organizing the educational process in the information and educational environment using state information systems has been insufficiently studied. This leads to a contradiction between the presence of state information systems and the lack of methods for their use in the educational process for the administration, teachers, students, and parents. The article discusses the implementation of automated information systems Dnevnik.ru and E-education in secondary schools and their impact on education quality management.

Keywords: State Information Systems, Information Educational Environment, Quality of Education.

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1 Introduction

In some countries, educational networks are used that unite educational institutions of the country to monitor the achievements of students. For example, in Greece - GRNET, Slovenia – ARNES, in Austria - ACOnet, in the UK - Janet, in Ireland - HEAnet, etc.

The analysis of foreign countries' experience (the USA, China, Finland, and others) shows that the quality of education is affected so much not by providing all students with computer equipment and Internet access, but by organizing IOS and using its capabilities for educational purposes.

At the same time, there is the Russian experience in organizing IOS, which has led to positive results, since in the international ranking in terms of Internet use Russia has risen from 70th place to 24th place in the world.

The basic requirements for the information and educational environment of an educational organization are written into the Federal State Educational Standard. Currently, most schools in Russia have completed the transition to the Federal State Educational Standard (FGOS) of primary, basic, and general secondary education. Following its introduction, the goals of education have also changed: the transition from “universal education” to a system-active paradigm. Currently, the objectives of education are aimed at developing the learner's personality, his or her personal, social, cognitive, and communicative abilities, that is, now the requirements for learning outcomes are evaluated in the form of personal, meta-subject, and subject results.

In these conditions, an essential role is given to information support of the educational process using modern information technologies, digital information, and educational resources in academic disciplines. [6]

IT development of the education sector, the organization of the information and educational environment in each school in the context of the introduction of the Federal State Educational Standard significantly increased the role of state IT systems (hereinafter GIS) in educational management. It becomes necessary to cooperate with educational organizations and IT companies that carry out automation and further support of GIS implemented in schools.

Thus, the state with the help of normative legal documents regulates the implementation of information systems in the educational information environment of educational institutions, designed to ensure the transition to a new quality in the general system of continuing education [4] (see **Ошибка! Источник ссылки не найден.**).

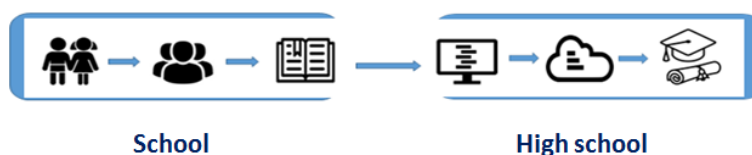


Fig. 1. Diagram of a continuing education system

Article 98 of the Federal Law “On Education in the Russian Federation” provides for the creation of several IT systems used in education. Decree of the Government of the Russian Federation as of August 8, 2013, No. 755 introduced a federal system to ensure the realization of state final certification of students. The second mandatory automated GIS is the “Register of organizations engaged in educational activities with state-accredited educational programs” (<http://accredreestr.obrnadzor.gov.ru/>). Information in this system is publicly available. The formation of information is conducted by Rosobrnadzor of Russia [1].

Also, there is a GIS of state supervision in the sphere of education, ensuring the unity of the requirements of state supervision in the field of education and taking into account its results. It is regulated by the Decree of the Government of the Russian Federation as of August 20, 2013, No. 719.

Another state GIS is the “Federal register of information on documents on education and (or) on qualifications, documents on training issued by organizations engaged in educational activities. (<http://frdocheck.obrnadzor.gov.ru/>).

The Federal GIS “The Federal Register of Apostilles affixed to the documents on education and (or) on qualifications” is necessary for work in countries that have joined The Hague Convention as of October 5, 1961. Check the information on the conferment of academic degrees and titles on the website <http://apostille.obrnadzor.gov.ru/>.

Currently, a federal interdepartmental accounting system (FMSU) for organizations and their students is being introduced, which is associated with the IT systems of public authorities and is used in the providing of online public services.

All these systems are designed to regulate control over the issuance of state-recognized documents on education, but cannot be used to organize the information and educational environment in educational institutions.

The problem of implementing state information systems in Russian educational institutions is that each region of Russia chooses a GIS that meets the requirements of the educational policy in the field of education and is based on the financial capabilities of the region. One of the most popular GIS in the field of education, supported by the Government of the Russian Federation and used to improve the quality of the educational process, is Dnevnik.ru and Online Education.

2 Analysis of the Possibilities of State Information Systems “Dnevnik.ru” and “Online Education”

GIS Dnevnik.ru was developed under the auspices of the national project "Education as a unified educational network, forming an online educational environment for all participants in the educational process (administration, teachers, students, parents). This project was supported by regional ministries, education departments, and the Plenipotentiary Representative of the President of the Russian Federation in the Northwestern Federal District. Today, according to the site <https://dnevnik.ru/news/89333>, more than 15 800 schools from 75 regions of Russia, 6 countries of near and far abroad have become participants in this project. The campaign is located in St. Petersburg, and campaign offices are located in 10 cities of Russia.

Dnevnik.ru is a closed IT system that guarantees the security of personal data. To enter the system requires user registration through the portal of public services. The system provides access to information around the clock and free basic functionality for users. Registered users can visit an online journal, a student's diary, a library of literature, an online test exam testing, competitions held by the country's largest universities, and other services.

Dnevnik.ru provides great opportunities for teachers. It stores information about the administration of the educational institution, news, legal documentation, there is access to a photo gallery, class schedule, homework control, reporting, generation of sheets, online testing, and more. The teacher can add comments and additional materials to any lesson. The interactive control module allows you to give homework to all or individual students, copy exercises for different classes and monitor progress. You can attach links to Internet resources, video tutorials, and tests.

School reports, which were previously filled in manually, are now generated automatically. All data is updated in real-time. The possibilities of conducting tests in the online form are also presented. In tests, the teacher can add illustrations, media files.

It is also possible to exchange opinions on homework, storing class files, a library, and a hybrid library of finished teaching materials. The class page contains a news feed where the teacher can post-operational information and announcements.

For students, the system offers an online diary, provides access to online educational resources, a personal profile, information about contests in which students can participate. Students have the opportunity to send the teacher their work, photographs of written work, etc. The student and teacher can also exchange comments on the work being done.

For parents, the system provides viewing of the student's online diary, homework, messages about changes in the schedule, correspondence with the teacher, selection of a tutor, and tracking of the student's location are implemented.

If a parent has several children of school age, it is possible to "link" all student profiles in one parent account. The function is available even if children attend various educational organizations.

Another state IT system "Online Education" is a product developed by the IRTech company in Samara, which is a leader in the field of IT solutions for the education system. The product is designed to support the innovative development of educational organizations. This complex automated information system is being tested in educational organizations of different regions of the Russian Federation. It unites preschool and educational institutions in a single network, organizations of additional and vocational education, and public authorities within the region. This system allows schools to almost completely automate management activities and the educational process. The system unites all participants in the educational process, which positively affects the activation of their educational activities, increasing its effectiveness [3].

On the other hand, this system allows federal, regional, and municipal education authorities to monitor the activities of educational institutions throughout the power vertical. The system complies with the legislation of the Russian Federation.

State IT system "Online Education" provides the user with the opportunity to create a complete school curriculum; calendar-thematic planning in all subjects and its use in

an online journal; the lesson schedule window is associated with an online classroom journal; placing and saving files with educational materials. GIS "Online Education" allows you to record the entire course of the educational process and its results in the subject; maintain a portfolio of projects and personal portfolios; create thematic, lesson plans and planning for each subject (and other teachers leading this subject will be able to use this planning). This provides a professional discussion by teachers of the content of training, forms, and methods of control on methodological advice.

Like Dnevnik.ru, "Online Education" contains an online journal, standard reports on academic performance and attendance, provides interaction between participants in the educational process; has a bulletin board, a catalog of school resources; internal email, the ability to organize a forum; send SMS.

Also, the GIS OE generates all administrative and final reports, can monitor and interact between educational organizations and education management bodies. To transfer a student from one school to another within the municipality, the system enrolls him in another organization while maintaining the student's basic data and personal file.

GIS "Online Education" is installed on the administrator's server computer, and you can work in the system from any computer connected to the Internet. On users' computers, only a standard browser program is required. A student, parent, the teacher has the opportunity to work from a home computer, entering the program with his username and password. For registered users, logging into the system from 2018 can be carried out through the portal of public services or [HTTP: //giseo.rkomi.ru](http://giseo.rkomi.ru). At the user's request, the system constructs reports with various data: reports on employees, on students, according to estimates, reports on additional education, on the movement of students, according to the curriculum.

In the GIS "Online Education" report designer, it is possible to create two types of reports - intra-school and system, where data from all schools in a district or region are combined. An employee can combine several roles: administrator, teacher, class teacher, parent. For each role, access rights to different parts of the system are configured, combinations of access rights can be set, which helps to determine who edited the information.

GIS "Online Education" allows you to create a plan and a protocol of control work indicating the difficulty levels of the tasks and the maximum score for its implementation, which fully complies with the requirements of the Federal State Educational Standard of all levels of education.

From the analysis of the capabilities of the two-state IT systems, it follows that each of them performs similar functions used by all participants in educational relations. However, for a more objective description of these systems, we decided to evaluate their capabilities in terms of managing the educational process, reports preparations, and assessing the quality of the educational process.

In terms of educational process management in the considered GIS, most of the functions coincide. In managing the quality of education, they provide more rapid feedback from parents due to the possibility to track learning progress in an online diary, thereby increasing the student's responsibility for the results of their studies in completing homework.

GIS “Online Education” is distinguished by the additional possibility to post courses developed by teachers. The administrative unit has the function of further education, informing parents about the results of the basic state examination and unified state examination.

It should be noted that GIS developers are constantly improving systems following the order of educational organizations.

3 Experience in Implementing GIS to Improve the Quality of Education

Schools in which GIS OE is being introduced have appreciated some advantages over similar systems. Among them, it should be noted: an integrated monitoring system within the educational institution and the municipality; the possibility of switching to online document management [5] and optimizing access to operational information; minimum requirements for the organization of the workplace and compatibility with Linux, installation of special programs is not required, compatibility with the mobile application.

With the implementation of state IT systems, the process of making managerial decisions changes, namely, based on the translation of standard reports into the online form, the time of the teacher and administrator is saved; always relevant and accessible information on the class and individual students; the frequency of decision-making has increased almost 2 times; now you can forecast the outcome of the educational process.

Of particular interest in the GIS “Online Education” is the MSOKO analytical section - a multilevel system for assessing the quality of education - a report designer that makes it possible to analyze objective results at various levels. Assessing the quality of education solves one of the main tasks: to monitor the current state of training of students in the subject, to monitor changes observed during training in grades 9 and 11 in preparation for basic state examination and unified state examination on the subject, to plan the work of the teacher taking into account the changes.

In terms of reports preparation on the educational process, the GIS “Online Education” contains a multi-level system for assessing the quality of education (MSOKO), which has a diagnostic map, personal monitoring, the disjunction between the results of the tests, and assessment indicators, a text analysis of the educational process, etc. The first step in testing MSOKO is tracking the results of control and diagnostic works on Mathematics, with the aim of planning and conducting differential correction work with students and increase the personal level in mastering the basic elements of the subject content.

To compare class results for the study period, both the subject and the class teacher need to study the report “Analysis of the results of tests (results of tests in comparison with the predicted results - IRO)”.

The report “Diagnostic card” contains information on the dynamics of the average individual score of the student on the subject according to the results of all the work performed by him and allows you to judge the level of standard acquisition by the student.

You should pay attention to a report such as “The disjunction between the results of tests and assessment indicators” to make grading of oral answers in the lesson and written work more objective. When working with the MSOKO module, we have the opportunity to see the scores of two years in the “Preliminary Exam Results” report and get a more objective overview. After passing the exams of the current school year, it is necessary to analyze the work performed.

It is necessary to pay attention to all teachers of the educational institution on “School Reports”. You can see and analyze your work with the help of the material “Results of teachers’ activities on subjects” and “Personal control of the results of teachers’ activities”.

The MSOKO module prepares reports objectively. We get used to evaluating the work of the student, and then suddenly the teacher finds himself in a situation where his work is evaluated and evaluated in comparison with colleagues in other subject areas. This should be taken correctly: do not engage in self-discipline, you need to analyze the result and draw competent conclusions, outline ways to solve problems, organize differentiated work with students with one mark “4”, with one mark “3”, with underperforming. The whole system with its analytical reports is designed to help the teacher organize daily work in such a way that the quality of education becomes higher.

You rarely see a teacher at school without classroom guidance. There are always a lot of concerns for this category of teachers. The existing MSOKO section “Student Reports” and “Class Reports” will help you, colleagues, work in all directions: with students and subject teachers. “Estimated indicators” will reveal subjects in which the student needs to strengthen the work to improve results. If you want, you can see the predicted exam results of your wards. The generated individual “Diagnostic card” will show objective results with an assessment of the standard development level (mastered / not mastered), and the report “Test results” will help to see undeveloped content elements.

You can make use of it and carry out daily, hard work with students, and with their parents, and with colleagues.

But. There is one significant addition: all of this you will see and be able to apply in your work if, when filling out the online journal, you correctly indicate the type of task. To do this, just be attentive and not rush. It is necessary to respect the work of colleagues, to be careful, and then the results of your joint work will please both yourself and your students. Do not be afraid to study, do not be afraid of the assessments of your work, do not be afraid to learn new technologies, improve, improve your professional level!

To create a plan of diagnostic or thematic test work, you must:

1. Before you start filling out the test reports, you need to check the link of the subject and codifiers of the subject.

For primary and basic school classes, content element codes are taken from the codifier for compiling monitoring and measuring material for the basic state examination, content element codes are taken from the codifier for the unified state examination.

To adjust the link of subjects in an educational institution, you must contact the user with administrator rights.

2. The test report can be filled in the GIS “Online Education” for the following types of tasks:

- examination,
- assessment work.
- testing,
- dictation.

To fill out the test report, you need to create a test plan.

3. To create a test plan in the window that appears, you need:

- select the difficulty level (basic or advanced);
- indicate the maximum score for the selected level;
- mark with flags the necessary coding of content elements.

Filling the test report takes place on the screen.

The protocol has scored for each student for each assignment.

The report “Test work protocol” contains summary information on the test work, its analysis, and results. Here it is important to see the level of fulfillment of the test work, the correspondence to the index of expected performance (its calculation is already in the system), the objectivity of the marks set, and, of course, a fairly detailed analysis of the control work.

The system further indicates verifiable content elements that have a low level of solvability. Summing up, we obtain data on academic performance, performance, level of failure, as well as recommendations for conducting individual work with students.

It is safe to conclude that the testing of MSOKO has yielded positive results:

1. We have come to such optimistic results in a long and difficult way, and the identification of difficult topics has allowed us to reduce the percentage of unsolvability of tasks during correctional work and in individual lessons with students.
2. The level of training in the last administrative training work as of 04.16.19 was 100% compared with the previous ones.
3. Significantly reduced time during analysis
4. Analysis of the test work has become more detailed and informative, including recommendations in working with specific students on difficult topics.
5. Monitoring is quite transparent; it allows providing objective results to all participants in the educational process.

Thus, by analyzing the work carried out according to the parameters proposed by MSOKO, it becomes possible to obtain visual objective results of the work of the school and teachers, which can be reviewed, analyzed, and included in the annual statistics.

This problem is now being solved by using information technology and mathematical methods of analysis and storage of information used in statistics. The MSOKO module allows the teacher to use the following types of reports: class reports, test results, class teacher reports, diagnostic cards, final grades - personal control, personal student reports. MSOKO module allows the head, deputy head to use various types of reports.

The most demanded making management decisions are personal control, the gap between the results of control work, and estimated indicators. Using the MSOKO module reports allows you to provide objective results for all participants in the educational process, to get visual objective results of the school.

Thus, having analyzed the capabilities of two-state IT systems and our own experience in both systems, we are more inclined to implement GIS "Online Education" as the most convenient to use, fill out, conduct systemic and multi-level monitoring of educational activities, and ensure the transition of an educational organization to new quality education.

In the Russian Federation today, the Unified System for Assessing the Quality of Education (ESOKO) has been formed, which makes it possible to timely identify and solve problems in the education system, monitor students' knowledge at different levels of education. This system allows you to have a complete picture of the quality of education in the country, analyze and take into account the influence of various factors on the results of educational institutions, conduct self-diagnostics and identify problems for schools, and parents to have information about the quality of children's knowledge.

Besides, the center of national and international studies of the quality of education of the Federal Institute for Educational Quality Assessment conducts in the Russian Federation national studies on the quality of education (NIKO), all-Russian verification work (VPR), and internationally comparative studies on the quality of education (PISA, TIMSS, PIRLS, ICCS, TALIS, PIAAC). All these studies make it possible to assess the competitiveness of schools, identify problems, compare changes taking place in the educational system. Assessment of the knowledge of schoolchildren is supplemented by studies of the professional competencies of teachers. This will provide a complete and objective assessment of the quality of education in an educational organization.

Assessment of school students' knowledge is supplemented by studies of teachers' professional competencies in the field of DRIN-IT and digital technologies [8, 9]. This will provide a complete and objective assessment of the quality of education in an educational institution.

In the Russian Federation, the assessment of educational achievements of students is carried out during the "state final certification of secondary school graduates in the form of unified state examination; state final certification of graduates of a primary school in the form of a basic state examination; international comparative studies (PISA, PIRLS, TIMSS, etc.); monitoring studies at the federal and regional levels; accreditation of educational institutions; various research projects carried out by individual research teams and organizations of the country; intermediate certification of students, organized at the level of class and school" [2].

A comprehensive quality assessment is carried out based on students' educational achievements (assessment of the subject, meta-subject, and personal results of general education); assessing the success of mastering the content of individual academic subjects; the dynamics of educational achievements of students; integrated use of procedures for the final assessment and certification of students and monitoring studies; tiered approach to the development of planned results; the use of a cumulative assessment system (portfolio), which characterizes the dynamics of individual educational achievements; the use of "along with standardized written or oral works of assessment

methods such as projects, practical works, creative work, introspection and self-assessment, observation, etc.; the use of contextual information about the conditions and features of the implementation of educational programs” [2].

4 An Educational Quality Model of an Educational Institution

After analyzing the literature on the quality of the educational process, we have compiled a model of the quality of education implemented in the educational organization. It includes 7 modules.

Module 1. Policy and quality assurance (regulatory documentation, license, the main activities of the educational organization, cooperation with other institutions).

Module 2. Educational programs (educational programs of the primary general education, basic general education, secondary general education, requirements for the development of educational programs for educational subjects, work programs in all subjects).

Module 3. Educational resources and student support system (information and educational environment and its components, the material and technical base of the educational organization).

Module 4 Assessment of the level of training and tools (results of the unified state examination, basic state examination, all Russian testing work, intermediate certification of students, MSOKO).

Module 5. The level of professionalism of teachers (professional development programs, methodological associations, individual portfolio of teachers, effective contract, etc.).

Module 6. Communication system (GIS OE, school website, VKontakte corporate group, e-mail, etc.).

Module 7. Informing the public about the learning outcomes (in-school newspaper, “Journalist” project, video news, media, self-examination, conference, parent-teacher meetings, etc).

Each of the modules performs its functions, the integration of which allows us to build a systematic assessment of the quality of the entire educational process in the educational organization and the educational process, in particular, based on the use of GIS OE as a component of online information educational environment.

To control the degree of teacher's knowledge of the GIS OE system, we developed criteria for filling out an online journal. Assessment of the teacher's work in the system was checked according to the parameters: timeliness of filling the lesson topics and the conformity of their course schedule, homework, making current grades, filling out the plan and protocol of the test work, the timeliness of making grades for the test work, final grades for the quarter, six months and other parameters (see **Ошибка! Источник ссылки не найден.**).

These diagrams clearly show the dynamics of the development of the skill of working with an online journal by teachers over the three years of implementation of GIS.

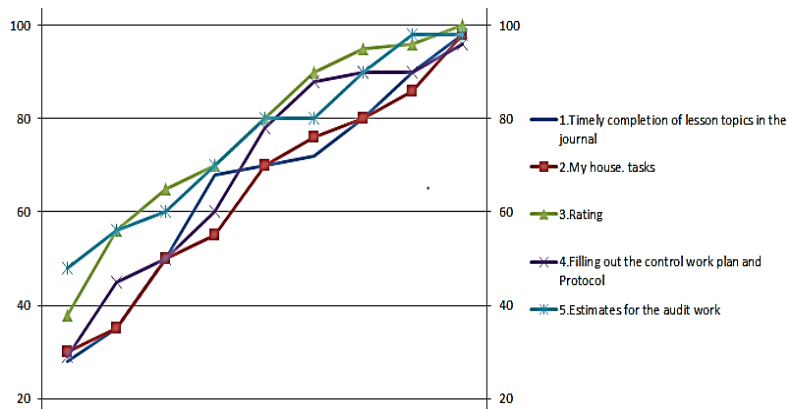


Fig. 2. Dynamics of the degree of mastering the skills of working in an electronic journal by teachers over three years figure caption is always placed below the illustration

5 Conclusion

Thus, the use of automated state systems based on cooperation with IT companies [7] allows not only to save the working time of the teacher and administrator but also significantly affect the quality of education.

State IT systems ensure the use of a single information educational space for each region and the provision of state and municipal services in the field of education in an online form.

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