INNOVATIVE IT TECHNOLOGIES IN EDUCATIONAL ACTIVITIES AND ENSURING DIGITAL SECURITY

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Abstract. The article deals with the topical issues of using innovative information technologies in education to improve the quality of education, optimize the management of educational processes, increase the efficiency of teachers and staff of educational institutions.

The research is devoted to analyzing the possibilities of using information technologies in educational activities and the main methods of ensuring digital security in this sphere.

The main directions of research include consideration of the possibilities of using information technologies in educational activities, analysis of the used information systems in education, analysis of the directions and experience of using artificial intelligence in education, the main methods of ensuring information security in educational systems.

The use of information technologies in the following directions of educational activity is considered: automation of administrative processes, organization of the educational process, interactive learning, transparency of management in an educational institution.

The article analyzes the capabilities of such frequently used information systems in education as the system "1C: Education" for the management of educational activities and accounting of students' progress, the platform "Directum" - for electronic document management, Moodle - e-learning system.

The following directions of using artificial intelligence in education are also considered: adaptive learning platforms, individual assistance to the participants of the educational process, automation of evaluation, prediction of future success and identification of the risk of failure in learning activities, creation of innovative educational materials. In analyzing the experience of using artificial intelligence in education, examples are given, each of which demonstrates the potential of neural networks to improve learning, feedback and management in education.

The article explores areas of digital security such as data encryption, multi-factor authentication, the need for regular software updates, educating and raising cybersecurity awareness among students and staff, establishing strict policies for accessing data and systems, using backup and anti-virus programs, collaborating with security experts, and others. This helps create a multi-layered defense strategy, keeping both data and users safe in an educational environment.

Keywords: information technology, information systems, artificial intelligence, digital transformation, digital security, educational sphere.

JEL Classification: C88, D83, I2, M15, O3

INTRODUCTION

In the context of digital transformation, educational institutions are using innovative information technologies (IT) to improve the quality of education, optimize the management of educational processes, and enhance the effectiveness of teaching staff. IT opens up new opportunities

for automating educational processes, personalizing educational interactions, and increasing access to knowledge.

The relevance of this research topic stems from the growing role of information technology in the education system. The introduction of digital tools enables solutions for document automation, student performance monitoring, distance learning, and other aspects that are becoming an integral part of the educational process. These changes require the development of approaches to improving information systems and methods for their application in educational institutions, as well as ensuring the security of the educational environment.

The purpose of this study is to analyze the potential for using information technology in educational activities and develop key areas for ensuring digital security in this area.

To achieve this goal, the following objectives are addressed:

– study the potential for using information technology in educational activities;
– analysis of information systems used in education;
– analysis of trends and experiences in using artificial intelligence in education;
– review of key methods for ensuring information security in educational systems.

Modern educational institutions face challenges that require optimizing the educational process and increasing the efficiency of administrative management. In response to these challenges, innovative IT is being actively introduced into educational activities, opening up new opportunities for automation, data management, and personalization of learning. IT enables the educational process to be organized using digital systems that ensure effective interaction between teachers and students, as well as support administrative activities (Pugacheva, 2021).

Automation of processes in the educational sector allows for more efficient management of large volumes of data and rapid response to changing conditions. The implementation of automated systems helps reduce the labor intensity of routine administrative processes, such as attendance tracking, grading, reporting, and other tasks that require significant time and human resources. Automation allows such processes to be completed more quickly and at a lower cost (Pugacheva, 2021).

ANALYSIS OF THE USE OF IT TECHNOLOGY IN EDUCATION AND METHODS OF ENSURING DIGITAL SECURITY

1. Study of the possibilities of using information technology in education

Let's consider the possibilities of using information technology in educational activities.

Information technology in education is aimed at solving the following problems (Pugacheva, 2019):

1. Automation of administrative processes.

This includes managing class schedules, tracking student progress, processing attendance data, and document management. These tasks traditionally take up a significant amount of staff time, but automation can significantly reduce labor and time costs.

2. Organization of the educational process.

IT tools make it possible to create and manage digital educational resources, conduct remote classes, and organize blended learning. For example, platforms such as Moodle, Microsoft Teams, and Google Workspace are becoming standard in the modern educational process.

3. Interactive learning.

Software including electronic textbooks, virtual reality (VR) and augmented reality (AR) systems, and simulators helps diversify the learning process and increase student engagement.

4. Increased management transparency.

Electronic diary and journal systems provide parents and students with real-time access to academic results. This promotes greater transparency and builds trust in the educational organization.

2. Analysis of information systems used in education

One of the most popular automation solutions is the 1C: Education system, which is widely used in educational institutions to manage learning activities and track student achievement. Its interface is shown in Figure 1.

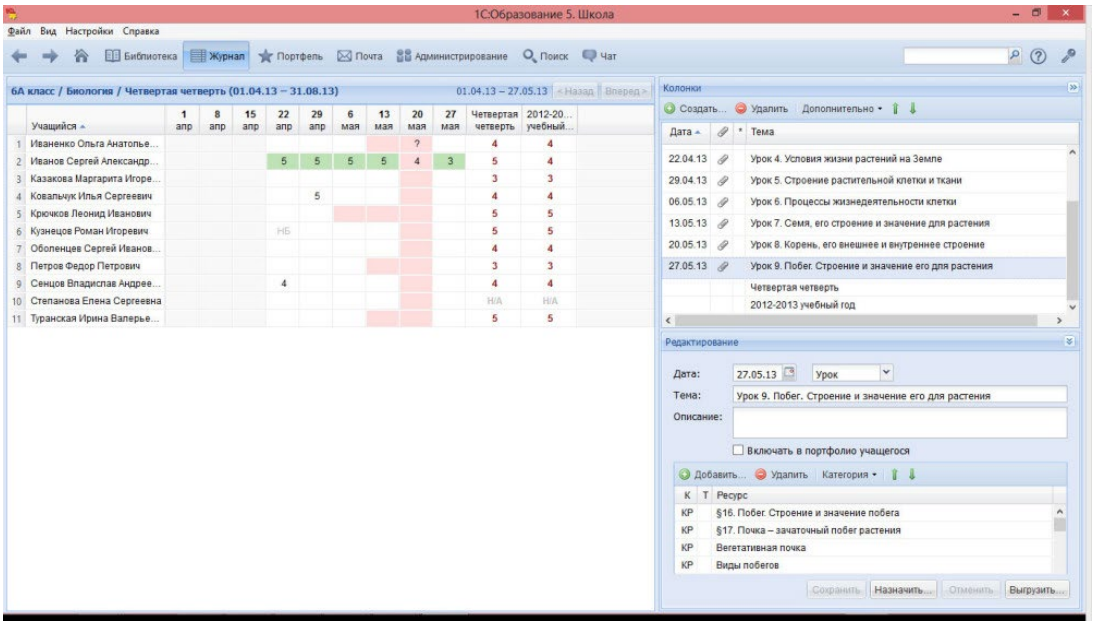


Figure 1. 1C: Education system.
Source: *1C: Education. Digital educational solutions*.

This system offers a wide range of functionality, including creating and maintaining academic performance reports, automated scheduling, attendance tracking, and other operations related to the educational process.

The 1C system allows teachers and administrators to easily access data and reports, making it a useful tool for management decision-making. By implementing this system, educational institution leaders can quickly evaluate the effectiveness of various educational programs and adjust the learning process based on current results.

Another important component of automation is the use of electronic document management platforms, such as Directum, the interface of which is shown in Figure 2.

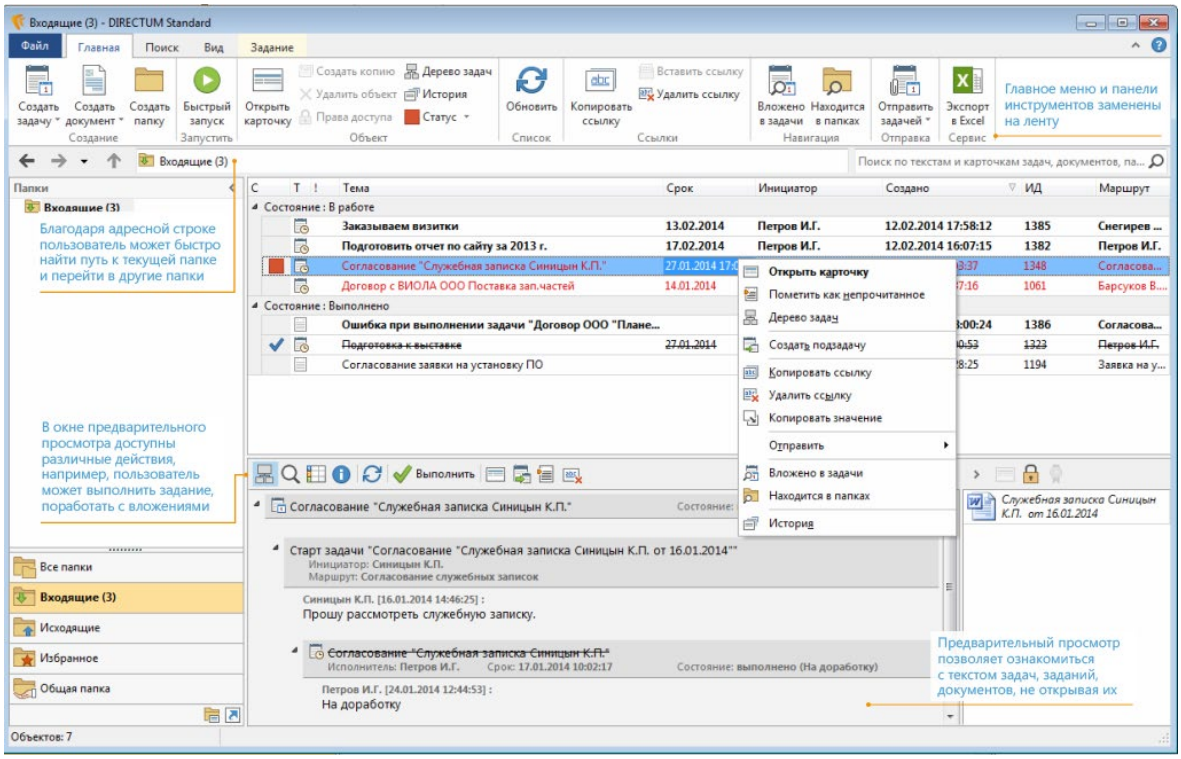


Figure 2. Directum platform.

Source: *Directum*: *An intelligent ECM system for large companies.*

This system optimizes document flow, improving organizational document management and ensuring task control. Directum supports the creation, storage, and transmission of electronic documents, reducing paper costs and simplifying the work of educational institution employees.

Moodle is one of the most well-known e-learning systems (Figure 3). It has been translated into more than 100 languages.

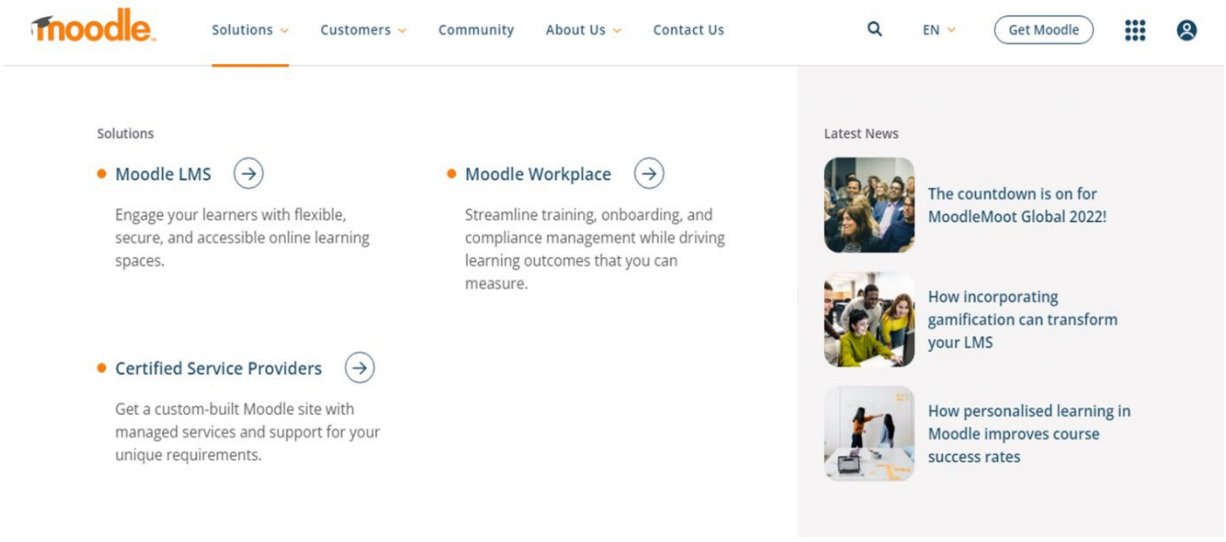


Figure 3. Moodle – a distance learning system.

Source*: Moodle LMS 5.0.*

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a popular distance learning system (DLS). It is successfully used by major universities worldwide, schools, and private companies. Its open source code allows for flexible customization of the platform to meet any needs.

The Moodle platform is versatile and highly customizable. This distance learning system was developed for schools and universities, but is also well suited for corporate environments and private use. Thanks to the collaboration of developers and a large user community worldwide, Moodle is constantly evolving, adding new tools, extensions, and modules. The DLS supports integration with other services, including video conferencing, analytics, payment systems, and uniqueness verification services.

The Moodle LMS solves the following tasks:

1. Conducting training courses. In Moodle, training materials (text documents, presentations, and videos) can be combined into a single training course, accessible to all students or a specific group.

2. Conducting tests during training. For this purpose, the Moodle LMS has a built-in test editor. It initially offers 15 assignment formats, from choosing the right answer to moving objects. To prevent course participants from peeking during the test, you can limit the time and attempt count. Moodle automatically checks user responses, displays their errors, and displays the final score.

3. Feedback to the course administrator. The learning system includes forums and comments for this purpose. If participants need to contact the instructor/course administrator to ask a question or discuss the material, they can leave comments or use the built-in forum.

4. Knowledge base creation. The Moodle system allows for the creation of an archive of materials accessible to all users at any time. In the knowledge base, students can find the lecture or video lesson they need.

5. Mobile learning capabilities. The system has an official Moodle mobile app (from Moodle Pty Ltd.), which allows you to take courses and tests from your smartphone or tablet, but this can also be done using a mobile browser. Using a mobile device, you can not only access learning materials but also administer the course. The app is available on Google Play and the App Store.

6. Learning statistics. The Moodle system tracks student performance and monitors their progress, generating reports for teachers/administrators. The reports show the time it took participants to complete the course and any errors made.

7. Blended learning. This format is currently very popular: students' complete theory remotely using Moodle courses, while practical classes are conducted offline. The system flexibly adapts to the current educational environment and global circumstances.

8. Student surveys and feedback. The system allows for assessment, feedback, and participant opinions on specific topics through surveys and polls. Both forms are integrated into Moodle. Surveys are compiled with pre-defined questions, while polls are prepared by the administrator.

9. Analytics. Moodle's integrated system generates reports that show the activity level of users on the platform's courses: how many people viewed the course and what comments they left.

Thus, Moodle can help reduce the financial and time costs of launching a training course and distance learning in general.

3. Analysis of the directions and experience of using Artificial Intelligence in education

Artificial intelligence (AI) and neural networks offer a number of opportunities for improving education. The main areas of their application in this area may be the following (Pugacheva, 2024):

– adaptive learning platforms. AI can be used to create learning platforms that can adapt to the learning needs of each individual learner. Based on training data and feedback, AI can suggest personalized materials and exercises.

– individualized assistance. Neural networks can be used to automatically analyze learners' performance to provide personalized feedback and recommendations for improving the learning process.

– automated assessment. AI can be used to automatically grade assignments, tests, and quizzes, helping teachers save time on marking and focus on more important educational tasks.

– predicting success. Based on training data and student assessments, AI can help predict their future success and even identify the risk of failure in learning.

– creating innovative educational materials. AI and neural networks can be used to create interactive educational materials, such as virtual labs, educational games, and interactive textbooks.

Let's consider the potential uses of certain neural networks in education (Pugacheva, 2024):

1. Teacherbot. To help teachers develop materials for their classes, Teacherbot provides quick answers to questions about what content they want to create. Teachers can use the service to generate assignments, exercises, and create teaching materials.

2. Gradescope. Gradescope is a web application that simplifies the process of administering and grading tests for teachers. It helps reduce the time spent on the entire educational process, assigning grades, and provides a more accurate picture of student progress.

3. Fobizz Tools. Fobizz Tools is a collection of educational apps. The platform offers a variety of resources, including online courses, live webinars, teaching materials, and tools for effective personalized education. It features AI assistants for text, images, and speech. With these tools, you can create worksheets, multimedia boards, surveys, websites, video and audio recordings, screen recordings, shortened links, shared files, and QR codes.

4. EssayGrader.ai. To help instructors quickly and accurately grade student work, EssayGrader.ai can be used. It features feedback, error, and summary reports, as well as an artificial intelligence detector. With it, instructors can determine whether the entire work was written by a neural network or only part of it.

During their studies at the university, students in the Faculty of Economics explore the following areas of neural network use: text writing, video creation, image generation, audio processing, photo processing, brand naming and logo creation, code writing, text translation into other languages, document and presentation creation, website and design creation, and more. Students primarily use ChatGPT 3.5 or GPT-4o, and for image generation, they utilize tools such as DALL-E, Kandinsky 2.2, Leonardo.ai, Stable Diffusion, GigaChat, Yandex Shedevroom, and other neural networks.

The introduction of artificial intelligence technologies into the educational process requires a rethinking of traditional approaches to assessing learning outcomes. Modern neural networks can generate texts by simulating statistical patterns in language, which can reduce the effort students expend on written assignments. This can reduce the quality of education and students' critical thinking.

Overall, the use of neural networks in education can transform the role of the teacher from a traditional performer to a personal mentor and data analyst. However, it is important to note that the human aspect of education remains essential, and teachers will always play a key role in the educational process, regardless of the technology used.

4. Key methods of ensuring digital security in education

Digital security in the education sector is ensured through various methods and practices aimed at protecting information, systems, and users.

The key methods of ensuring digital security are as follows (Pugacheva, 2021):

1. Data encryption. Using encryption to protect confidential information, both in transit and at rest. This helps prevent unauthorized access to data.

2. Multifactor authentication (MFA). Implementing additional layers of verification when logging into systems (e.g., passwords + SMS codes or biometric data) to enhance account security.

3. Regular updates and patches. Keeping software and operating systems up to date to eliminate vulnerabilities that could be exploited by attackers.

4. Training and awareness. Conduct cybersecurity training for students and employees to ensure they are aware of the risks and can recognize potential threats, such as phishing.

5. Access policies. Establish strict data and system access policies, including the principle of least privilege, to ensure users have access only to the information they need.

6. Monitoring and auditing. Regularly monitor systems for suspicious activity and conduct security audits to identify vulnerabilities and evaluate the effectiveness of existing measures.

7. Data backup. Create regular backups of critical information to protect against data loss due to cyberattacks or technical failures.

8. Firewalls and antivirus software. Use software to protect networks and devices from malware attacks and viruses.

9. Network segmentation. Separate the network into different segments to restrict access between them and reduce the risk of threat propagation.

10. Incident management. Having a clear incident response plan that includes actions to identify, analyze, and mitigate the consequences of cyberattacks.

11. Collaborating with security experts. Engaging external specialists to conduct security assessments and implement best practices.

These methods help create a multi-layered security strategy, ensuring the security of both data and users in the educational environment.

CONCLUSIONS

Thus, information technology is a key tool for modernizing the educational process, ensuring automation, efficiency, and precision of management. Its use streamlines administrative tasks, improves interaction between participants, and creates conditions for effective learning and decision-making.

Improving the automation of educational activities through the use of IT is not simply a technical upgrade but also a strategic objective that contributes to the modernization of the educational process. The implementation of systems that automate processes such as scheduling, managing educational materials, and tracking academic performance makes educational institutions more flexible, efficient, and responsive to the needs of modern society.

Artificial intelligence and neural networks can transform education, making it more accessible, personalized, and effective for learners.

With the increasing digitalization of educational processes, the need to protect student, faculty, and administrative data from leaks and cyberattacks is growing. This requires the implementation of appropriate protocols and security systems. Digital security in the educational sector is a complex

process that requires attention to various aspects of protecting the information and technologies used in the educational process.

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