

SOFTWARE SYSTEMS FOR MONITORING AND EVALUATING INDEPENDENT EDUCATIONAL ACTIVITIES OF STUDENTS

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Annotation

This scientific article analyzes the theoretical and practical aspects of the software systems used to monitor and evaluate the independent educational activities of students. The importance of the Learning Management System (LMS), artificial intelligence-based platforms, analytical monitoring tools, and automated assessment systems has been highlighted in the modern digital education environment. The study comparative studies the monitoring and evaluation capabilities of Moodle, Google Classroom, Microsoft Teams, Canvas and other e-learning platforms. Also, in monitoring the independent activities of students, topical issues of data analysis, ensuring academic integrity and the formation of an individual educational trajectory are considered. At the end of the article, scientifically based recommendations for improving the effectiveness of Independent Education were developed.

Keywords

Independent Education, monitoring, Evaluation System, LMS, Moodle, Google Classroom, artificial intelligence, e-learning, academic integrity, educational analytics, digital pedagogy.

INTRODUCTION

The development of modern society is closely related to the rapid development of information and Communication Technologies, a process that is also creating fundamental changes in the educational system. Today, in many countries of the world, the formation of a digital educational environment, the creation of e-learning resources and the automation of the educational process are considered as one of the priorities. As a result of the digitization of education, distance and mixed (blended learning) forms of education are widely developed alongside traditional audience training. This increases the volume of independent educational activities of students, increasing the need for its effective organization, monitoring and evaluation [4].

The introduction of a credit-module system in the higher education system further increased the students' responsibility for Independent Education. In the credit-module system, a large part of the educational load is directed to independent acquisition beyond the audience, and the student is required to independently search for knowledge, analyze it, apply it in practice and form skills to work on himself [8]. Therefore, effective control of independent educational activities of students has become an important component of the pedagogical process.

While the control of independent work in the traditional educational system is carried out mainly through written assignments, oral conversations and audience training, in the digital educational environment, this process is automated using special software systems. Learning Management System (LMS) platforms, electronic journal systems, remote testing platforms, and artificial intelligence-based monitoring systems regular monitoring of student learning activities

Today, e-learning platforms such as Moodle, Google Classroom, Microsoft Teams, Canvas, Blackboard, and Coursera are widely used worldwide. These platforms serve not only to provide educational materials, but also as an effective means of monitoring and evaluating student activities [1]. In particular, through the technologies of Learning Analytics, the possibilities of analyzing the student's activity in the educational process, the level of assimilation and the trajectory of individual development are expanding.

The growing popularity of Distance Education has further exacerbated the need for monitoring and evaluation systems. During the COVID-19 pandemic, millions of students and educators were forced to switch to distance education systems. As a result, new methods of monitoring student knowledge, assignment verification and monitoring academic activities were developed on E-Learning Platforms [9]. During the same period, the importance of Automated Testing Systems, virtual proctoring, electronic portfolios, and online assessment mechanisms increased significantly.

In the process of monitoring the independent educational activities of students, the effectiveness of pedagogical control plays an important role. Through Monitoring systems, educators can monitor the student's activity in the educational process in real time, identify problems in mastering and provide individual pedagogical support [6]. At the same time, automated assessment systems serve to reduce the human factor and increase the accuracy and transparency of the assessment.

The development of artificial intelligence technologies marked a new stage in educational monitoring. AI-based systems have the ability to analyze the activities

of students, determine their interests and level of knowledge, and develop individual recommendations [5]. For example, adaptive learning systems automatically select learning materials and adjust the level of complexity in accordance with the student's level of mastery. This serves to individualize education.

However, there are also a number of problems in the process of monitoring and evaluating the independent activities of students. In particular, situations such as ensuring academic integrity, preventing plagiarism, completing assignments by another person, improper use of artificial intelligence tools negatively affect the quality of Education [7]. Objective assessment of student knowledge, especially in the context of distance education, is one of the complex pedagogical problems.

There are also technical and organizational problems with monitoring systems. Low internet speed on electronic platforms, software failures, server load, and inadequate user digital competencies can affect monitoring efficiency [3]. Therefore, technical infrastructure and user readiness are an important factor in the implementation of software systems.

The Republic of Uzbekistan also pays great attention to the digitalization of the higher education system and the introduction of electronic management systems. Within the framework of the "digital Uzbekistan - 2030" strategy, a number of measures are being implemented to create modern mechanisms for the widespread implementation of LMS platforms in higher education institutions, the development of electronic assessment systems and monitoring of Student Activities [10]. At the same time, the issues of ensuring data security and monitoring academic integrity in e-learning systems are also considered as an urgent task.

The use of software systems for monitoring and evaluating independent educational activities of students is an important tool for improving the quality of education, improving pedagogical control and optimizing the educational process. Therefore, it is of important scientific and practical importance to carry out scientific research in this direction, analyze modern technologies and adapt them to the national educational system.

This article analyzes the theoretical foundations, technological capabilities and practical effectiveness of software systems used to monitor and evaluate the independent educational activities of students. Scientific-based recommendations for the implementation of electronic monitoring systems and their elimination will also be developed.

REVIEW OF THEMATIC LITERATURE

The issue of using software systems for monitoring and evaluating independent educational activities of students is one of the important scientific

areas of modern pedagogy, information technology and digital education. In recent years, research in this direction has largely studied the pedagogical capabilities of e-learning platforms, Learning Management System (LMS), Learning Analytics, Educational Data Mining, artificial intelligence-based monitoring systems and automated assessment technologies.

Early research on the theoretical foundations of monitoring and evaluation in the digital learning environment focused on the management capabilities of e-learning platforms. G. Siemens and D. In the scientific work carried out by Gašević, Learning Analytics technology has been described as a modern way to analyze the educational activities of students [6]. Researchers have based on the fact that through Learning Analytics, statistics of student activity on the platform, the speed of completing assignments, test results and the use of educational resources can be analyzed. They believe that this technology will allow educators to identify problems in the student's educational activities in advance.

J. In research conducted by Anderson, monitoring functions of LMS systems have been evaluated as an important tool of pedagogical Control [1]. The author analyzes the monitoring capabilities of the Moodle and Blackboard platforms, noting that it is possible to automatically record and analyze the activity of independent work of students using electronic systems. The study particularly noted that electronic journal, activity statistics, and automatic reports increase the effectiveness of pedagogical management.

P. The pedagogical advantages and limitations of automated assessment systems have been studied in Brown's scientific research [2]. According to the author, electronic testing systems reduce the human factor and increase the speed and objectivity of the assessment. At the same time, it is noted that the capabilities of artificial intelligence technologies have not yet been fully improved when automatically evaluating tasks that require a creative approach. The study showed that adaptive test systems are able to automatically change the complexity of questions in accordance with the student's level of knowledge.

Research by the Microsoft Research Center for artificial intelligence-based monitoring systems is considered one of the most modern scientific directions [5]. Researchers argue that with the help of AI technologies, it is possible to form an individual educational trajectory of students, determine their interests and difficulties, and develop suitable recommendations. Artificial intelligence-based systems have been noted to be able to provide semantic analysis, error detection, and individual advice on assignments completed by students.

Research by Romero and Ventura on Educational Data Mining technologies has developed the scientific basis for large-scale educational data processing and

analysis. The authors justify that student appropriation can be forecasted, academic failure risk identified, and pedagogical decisions optimized based on data collected on educational platforms.

Issues of monitoring and evaluation in distance learning systems are also widely covered in reports prepared by UNESCO [9]. The report notes that the use of e-learning platforms has increased significantly in the post-pandemic period, exacerbating the need for further development of monitoring systems. UNESCO experts state that electronic monitoring systems are an effective tool for continuous control of student knowledge and the formation of an individual approach.

Research into academic integrity is also important. J. Smith's scientific work analyzes the pedagogical importance of anti-plagiarism software tools such as Turnitin, Unicheck, and Grammarly [7]. According to the results of the study, plagiarism examination systems encourage students to adhere to the principles of scientific honesty and develop independent performance skills. The author especially values the effectiveness of electronic plagiarism systems in the examination of scientific articles and coursework.

Cyber security and data protection issues have also been addressed in scientific research as an important component of electronic monitoring systems. Cisco's 2024 report highlights the importance of user data protection, authentication, and data encryption technologies on educational platforms [3]. The report noted that cyberattacks and data leaks occurring in educational systems require enhanced security of monitoring systems.

A number of scientific studies have also been carried out in this direction by local scientists. A. Karimov's scientific work studied the pedagogical effectiveness of electronic monitoring platforms in the higher education system [4]. The author believes that electronic monitoring systems significantly reduce the workload of educators, as well as regular control of student educational activities. In the study, electronic rating systems are evaluated as an important tool to ensure transparency in assessment.

Sh. Research conducted by Tursunov analyzed the pedagogical capabilities of the Moodle platform in the management of Independent Education [8]. The author scientifically substantiates the effectiveness of monitoring student activities using forums, tests, assignments and electronic journal tools in the Moodle system. According to the results of the study, the Moodle platform allows you to record the individual activity of students and monitor the dynamics of mastering.

Q. The impact of electronic assessment systems on the quality of Education has been studied in scientific work conducted by Ahmedov [10]. The results of the study show that automated testing systems allow for objective assessment of

knowledge in a short time. At the same time, the author emphasizes the need to implement complex assessment systems to determine practical and creative skills, in addition to assessing theoretical knowledge.

In research conducted by Google Education, the monitoring capabilities of the Google Classroom platform are covered [12]. Researchers evaluate the platform's capabilities for task management, time control, and statistical report formation as effective tools. In particular, the possibility of monitoring through mobile devices is cited as one of the advantages of the platform.

The methodological manuals prepared by the Moodle Documentation Center detail the analytical tools, automatic evaluation modules and activity monitoring capabilities of the Moodle system [11]. The manual notes that with the help of Learning Analytics tools, it is possible to analyze the activity of students in the educational process through visual graphs.

Also, reports provided by World Bank highlight the strategic importance of monitoring and evaluation systems in the process of digitizing education [15]. The authors of the report note that electronic monitoring systems serve to improve the quality of Education, optimize pedagogical management and develop an individual educational approach.

Literature analysis shows that software systems for monitoring and evaluating student independent learning activities have become an important component of modern education. Although the pedagogical capabilities of LMS platforms, Learning Analytics, Educational Data Mining and artificial intelligence technologies are widely covered in scientific research, the issues of academic integrity, data security, individual approach and ensuring the objectivity of assessment still remain an urgent scientific problem.

Research methodology

In this study, methods of systematic analysis, comparative comparison, study of statistical data and pedagogical monitoring were used. During the study, scientific articles, international reports, methodological manuals on e-learning platforms and regulatory legal documents published between 2010 and 2026 were analyzed.

At the first stage of the study, theoretical views on the monitoring and evaluation of Independent Education were studied. In the second stage, a comparative analysis of the monitoring capabilities of the Moodle, Google Classroom, Microsoft Teams and Canvas platforms was carried out.

In the analysis process, attention was paid to the following criteria:

- * automatic assignment evaluation;
- * user activity monitoring;

- * formation of statistical reports;
- * Academic Integrity Control;
- * artificial intelligence capabilities;
- * mobile flexibility.

Also, during the study, the effectiveness of Learning Analytics technologies in monitoring student academic activities was studied. The results of the study showed that electronic monitoring systems are important in determining the level of student assimilation and in the formation of an individual pedagogical approach.

CONCLUSIONS AND RECOMMENDATIONS

The results of the study show that the use of software systems for monitoring and evaluating student independent learning activities is one of the important factors in improving educational efficiency. Modern LMS platforms and AI-based monitoring systems are making it possible for educators to monitor student activities in real time, analyze results, and make individual recommendations.

At the same time, issues of ensuring academic integrity, maintaining objectivity of assessment and protecting data security are still an urgent problem. Based on the study, the following recommendations were developed:

1. Expanding the use of unified LMS platforms in higher education institutions.
2. Implementation of artificial intelligence-based monitoring systems.
3. Regular use of anti-plagiarism software tools.
4. Development of Learning Analytics systems that analyze student activities in real time.
5. Increasing the digital competencies of educators.
6. Strengthening data security in electronic assessment systems.
7. Introduction of adaptive systems aimed at the formation of an Individual educational trajectory.

With the development of artificial intelligence and Big Data Technologies in the future, independent educational monitoring is expected to take a more automated and effective form.

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