

Improving Electronic Assessment Methodology in Higher Education Based on Learning Analytics

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ABSTRACT

This article examines the improvement of electronic assessment methodology in higher education institutions based on Learning Analytics technology. The study explores the collection, processing, and analysis of educational data generated within digital learning environments. The role of Learning Analytics in monitoring students' learning activities, assessing academic performance, and supporting pedagogical decision-making is analyzed. A conceptual model for electronic assessment based on Learning Management System (LMS) data is proposed. The study also substantiates the potential of Learning Analytics to enhance the objectivity, transparency, and effectiveness of the assessment process.

Keywords:

Learning Analytics, electronic assessment, Learning Management System (LMS), higher education, digital education, learning analytics, learning monitoring, dashboard, formative assessment, summative assessment.

Oliy ta'limda Learning Analytics asosida elektron baholash metodikasini takomillashtirish

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Annotatsiya. Mazkur maqolada oliy ta'lim muassasalarida Learning Analytics texnologiyasi asosida elektron baholash metodikasini takomillashtirish masalalari yoritilgan. Elektron ta'lim muhitida shakllanadigan ta'lim ma'lumotlarini yig'ish, qayta ishlash va tahlil qilish imkoniyatlari o'rganilib, Learning Analytics texnologiyasining talabalarning o'quv faoliyatini monitoring qilish, o'zlashtirish darajasini baholash hamda pedagogik qarorlar qabul qilishdagi ahamiyati tahlil qilingan. LMS platformalarida hosil bo'ladigan ma'lumotlardan foydalanish asosida elektron baholashning konseptual modeli taklif etilgan. Shuningdek, Learning Analytics texnologiyasining baholashning obyektivligi, shaffofligi va samaradorligini oshirishdagi imkoniyatlari asoslab berilgan.

Kalit so'zlar. Learning Analytics, elektron baholash, LMS, oliy ta'lim, raqamli ta'lim, ta'lim analitikasi, monitoring, dashboard, formativ baholash, summativ baholash.

Совершенствование методики электронного оценивания в высшем образовании на основе Learning Analytics

Аннотация. В статье рассматриваются вопросы совершенствования методики электронного оценивания в высших образовательных учреждениях на основе технологии Learning Analytics. Исследованы возможности сбора, обработки и анализа образовательных данных, формируемых в электронной образовательной среде. Проанализирована роль Learning Analytics в мониторинге учебной деятельности студентов, оценке результатов обучения и принятии педагогических решений. Предложена концептуальная модель электронного оценивания с использованием данных, получаемых из LMS-платформ. Обоснованы преимущества применения Learning Analytics для повышения объективности, прозрачности и эффективности процесса оценивания.

Ключевые слова. Learning Analytics, электронное оценивание, LMS, высшее образование, цифровое образование, аналитика обучения, мониторинг, dashboard, формативное оценивание, суммативное оценивание.

Introduction. Today, the digitalization of the higher education system is considered one of the key factors in enhancing the quality of education and effectively managing the educational process. Although electronic assessment systems enable rapid and transparent evaluation of students' knowledge, most of them lack the capability to deeply analyze the dynamics of learning activities and educational data.

In addressing this issue, **Learning Analytics** technology is of particular importance. By analyzing the data generated within LMS platforms, it supports monitoring students' academic progress, analyzing assessment results, and facilitating data-driven pedagogical decision-making.

In this regard, the aim of this article is to substantiate the scientific and methodological approaches to improving electronic assessment methodology in higher education based on Learning Analytics.

Literature Review. The theoretical and practical foundations of Learning Analytics technology have been extensively studied by foreign scholars. In particular, the research of George Siemens, Phil Long, Dragan Gašević, Simon Buckingham Shum, Rebecca Ferguson, Shane Dawson, and Ryan S. Baker focuses on the emergence of Learning Analytics, educational data analysis, monitoring learning activities, predicting academic performance, and enhancing electronic assessment systems. Specifically, George Siemens and Phil Long

established Learning Analytics as a vital academic field that serves to optimize the educational process.

Among CIS scholars, V.P. Bespalko, A.A. Andreev, E.S. Polat, A.V. Khutorskoy, A.P. Ershov, and others have investigated the pedagogical foundations of information and communication technologies, distance education, e-learning environments, and electronic assessment systems. Their works illuminate issues related to the organization of e-learning, educational process management, and the practical implementation of modern pedagogical technologies.

Among Uzbek scholars, researchers such as A.A. Abduqodirov, U.Sh. Begimqulov, N.H. Taylaqov, M. Aripov, R.H. Ayupov, and B.X. Xodjayev have conducted scientific investigations on the digitalization of education, e-learning resources, the use of LMS platforms, and the development of electronic assessment. However, analysis indicates that the integration of Learning Analytics technology into electronic assessment methodology, the analysis of student performance based on educational data, and the scientifically grounded improvement of the assessment process remain insufficiently researched. Therefore, this study is specifically aimed at addressing this empirical gap [7].

Main Part. Learning Analytics (LA) is a modern technology that serves to collect, process, and analyze data related to learners' educational activities and support pedagogical decision-making based on these insights [1].

This technology makes it possible to analyze log data generated in LMS platforms, test results, assignment completion status, and students' learning engagement [3].

In international practice, Learning Analytics tools are widely applied within Moodle, Canvas, Blackboard, and other LMS platforms, yielding effective results in monitoring students' academic progress, predicting academic risk, and enhancing the quality of education [5].

Learning Analytics processes large volumes of educational data relying on Big Data technologies and presents them visually through dashboards [6]. Furthermore, the application of Predictive Analytics methods makes it possible to forecast students' future academic performance in advance [2].

Thus, Learning Analytics serves as an essential technological solution that enhances the objectivity, efficiency, and effectiveness of the electronic assessment system. The effective utilization of this technology is of significant importance in improving electronic assessment

methodology and elevating educational quality [4].

In this study, a Learning Analytics-based electronic assessment methodology was proposed. This methodology is aimed at the comprehensive evaluation of students' learning activities by analyzing educational data generated within LMS platforms. The primary stages of the methodology consist of collecting data generated on the LMS platform, analyzing it using Learning Analytics tools, monitoring student academic engagement, formulating assessment results, visualizing them via dashboards, and making data-driven pedagogical decisions.

The proposed methodology enables instructors to continuously monitor the current state of student progress, identify educational challenges in a timely manner, and make pedagogical decisions based on an individualized approach. Consequently, the objectivity, transparency, and efficiency of the electronic assessment process are enhanced. The developed conceptual model is presented in Figure 1.

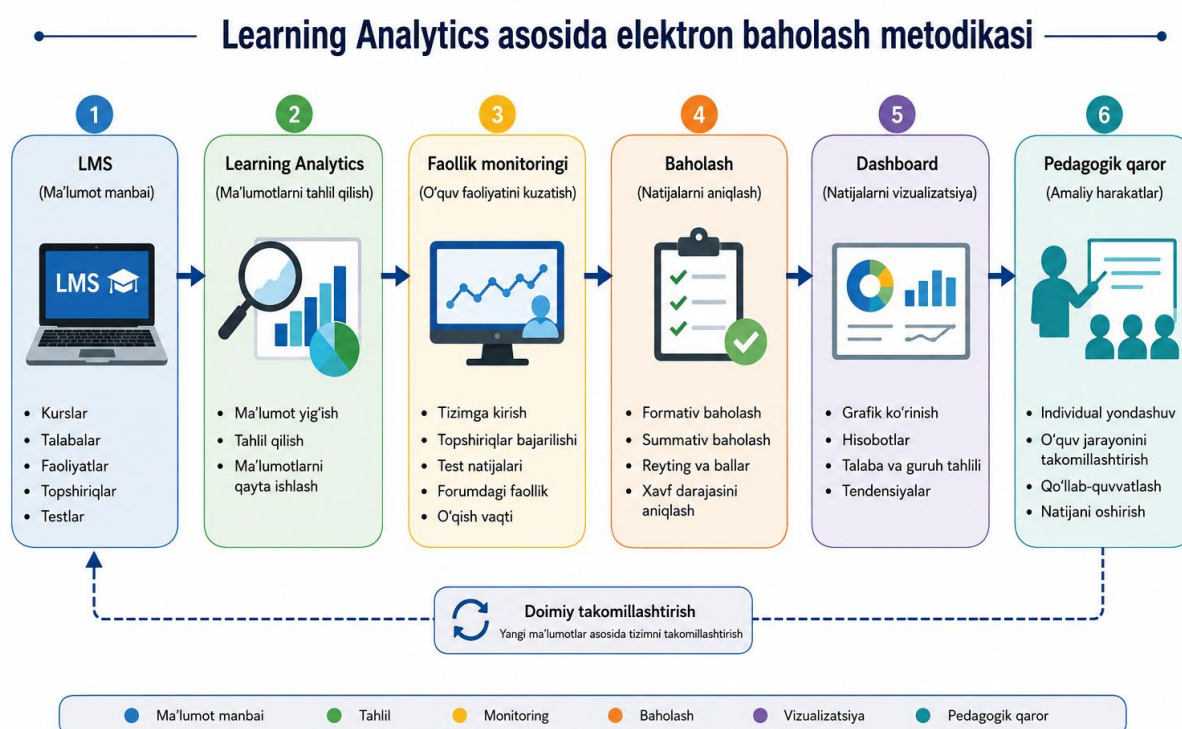


Figure 1. Conceptual model of electronic assessment methodology based on Learning Analytics

This model illustrates the logical sequence of analyzing educational data during the electronic assessment process and making effective pedagogical decisions based on its outcomes.

The proposed Learning Analytics-based electronic assessment methodology possesses a number of advantages compared to traditional assessment methods. First and foremost, by monitoring data generated within LMS platforms in real time, students' academic engagement and performance levels are systematically tracked. This ensures the

transparency and objectivity of the assessment process.

This methodology allows for the individual analysis of each student's learning activities, the automatic generation of reports, and the prediction of academic performance. Consequently, instructors can make rapid pedagogical decisions, organize the educational process through an individualized approach, and reduce the time spent on assessment. The primary advantages of the proposed methodology are presented in Table 1.

Advantage	Description
Real-time monitoring	Enables continuous tracking of students' academic engagement and performance outcomes.
Assessment transparency	All assessment results are generated objectively based on quantitative digital data.
Individualized approach	Each student's learning activities and academic trajectory are analyzed individually.
Automated analysis	Data is processed automatically to generate analytical reports.
Predictive modeling	Allows for forecasting students' future academic performance levels in advance.
Reduction of instructor workload	Saves time through the automation of assessment and analytical processes.

Table 1. Advantages of the Learning Analytics-based electronic assessment methodology

These advantages demonstrate that Learning Analytics technology serves as an effective tool for improving electronic assessment methodology and elevating educational quality.

Research Methodology. During the research process, methods such as a systemic approach, comparative analysis, pedagogical observation, scholarly literature review, conceptual modeling, and synthesis were employed. The capabilities of Learning Analytics technology within electronic assessment systems were analyzed based on educational data generated in LMS platforms. Furthermore, a conceptual model of the electronic assessment methodology was

developed, and its pedagogical effectiveness was theoretically substantiated.

Analysis and Results. The analysis indicated that integrating Learning Analytics technology into the electronic assessment process enables a comprehensive evaluation of students' learning activities. Based on educational data generated within LMS platforms, students' academic engagement, assignment completion status, test scores, and performance dynamics are systematically monitored.

Under the proposed methodology, the assessment process is conducted in real time, outcomes are visually presented via dashboards, and instructors are enabled to make rapid pedagogical decisions. This

approach enhances the objectivity and transparency of assessment, ensures an individualized approach, and reduces the instructor's workload.

The obtained results confirm that employing Learning Analytics technology is an effective tool for improving electronic assessment methodology and exerts a positive impact on enhancing assessment quality in higher education institutions.

Conclusion. The article analyzed scientific and methodological approaches to improving electronic assessment methodology in higher education institutions based on Learning Analytics. The capabilities of Learning Analytics technology in analyzing educational data generated within LMS platforms, monitoring student engagement, and supporting the assessment process were substantiated.

The proposed methodology serves to enhance the objectivity, transparency, and speed of electronic assessment, ensure an individualized approach, and improve the efficiency of pedagogical decision-making. The research findings demonstrate that integrating Learning Analytics technology into electronic assessment systems is one of the most promising directions for enhancing assessment quality in higher education.

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