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THE USE OF BIG DATA IN THE EDUCATION SYSTEM OF UZBEKISTAN

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Abstract

The aim of this article is to explore the potential and prospects for implementing big data technologies in the education system of the Republic of Uzbekistan. The objectives of the study are to analyze current digital processes in education, identify areas of big data application, and outline key challenges and barriers to implementation. The main research method is a comparative analysis of international and national experiences in education digitalization, along with content analysis of regulatory documents and Uzbekistan's digital development strategies. The scientific novelty of this work lies in the systematization of approaches to using big data in the educational environment of Uzbekistan, taking into account its socio-economic and technological context. The practical significance of the results is in the development of recommendations for public and educational institutions on the implementation of big data analytics systems to improve the quality of learning and educational management.

Keywords

big data, education, digitalization, Uzbekistan, analytics, digital transformation, EdTech.

Introduction

Amid the rapid development of digital technologies, special attention is being paid to the use of Big Data in various spheres of life, including education. Big Data refers to vast volumes of heterogeneous information arriving in real time and requiring special methods of storage, processing, and analysis. Globally, Big Data is actively implemented in educational systems to improve the quality of learning, adapt educational programs, personalize learning approaches, and enhance the efficiency of managerial decisions.

Uzbekistan, currently undergoing an active phase of digital transformation, is also taking steps to integrate modern technologies into the educational process. However, the implementation and use of Big Data in this field is still in its early stages and requires comprehensive study. Analyzing the current state, potential,

and prospects of using Big Data in Uzbekistan's education system is particularly important in light of the educational modernization tasks outlined in national programs and digital development strategies.

The relevance of the study lies in the need to enhance the effectiveness of Uzbekistan's education system within the digital economy. Big Data opens broad opportunities for learning analytics, diagnosing students' educational needs, monitoring academic performance, and forecasting educational outcomes. Additionally, using Big Data helps make more informed decisions at the level of educational institutions and ministries.

Despite some initiatives toward education digitalization, there is no comprehensive study in Uzbekistan devoted to the implementation and use of Big Data in the education system. Existing barriers, such as a lack of qualified personnel, limited access to data analysis technologies, and weak legal frameworks, require academic analysis and the development of recommendations. Therefore, this study is timely and important for forming an effective model of Big Data usage in the country's education system.

In global academic literature, the use of Big Data in education has been actively studied since the early 2010s. Researchers such as J. West, V. Kaiser, R. Ferguson, and M. Long emphasize the importance of learning analytics for personalizing educational trajectories, identifying problems at early stages, and improving academic performance.

Numerous studies consider Big Data as a tool for:

- analyzing student behavior in online courses (MOOCs)
- predicting dropouts
- optimizing schedules and academic workloads
- monitoring student engagement

Foreign literature pays special attention to ethics, data privacy, and teachers' digital literacy. In the CIS countries, studies on Big Data in education are still emerging. Some publications address the digitalization of education in Russia and Kazakhstan. However, there are very few scholarly works on this topic related to Uzbekistan. Existing sources mostly focus on digital infrastructure and general directions for developing educational information systems, highlighting the need for comprehensive research in this area.

Research Objectives and Tasks

The objective of this research is to identify the current state, challenges, and prospects of using big data technologies in Uzbekistan's education system and to develop recommendations for their effective implementation.

Research tasks:

1. To study theoretical foundations and international experience of applying Big Data in education.

2. To analyze the current level of digitalization in educational institutions in Uzbekistan.

3. To identify potential areas for Big Data application in the national education system.

4. To assess major barriers and risks associated with Big Data implementation in education.

5. To develop practical recommendations for integrating big data analytics into education policy and management.

Research Methodology

This study applies a mixed (qualitative-quantitative) approach, enabling the collection of both general statistical data and a deep contextual understanding.

Research methods include:

- Literature and regulatory document analysis: review of academic publications, education digitalization strategies, and Uzbekistan's legal acts related to ICT and education.

- Content analysis: examination of official reports from the Ministry of Higher Education, Science and Innovation, data from the State Statistics Committee, and international organizations (e.g., UNESCO, World Bank, OECD).

- Surveys and interviews: conducting online surveys with representatives of educational institutions (administrators, teachers, IT specialists) and semi-structured interviews with experts in education digitalization.

- Comparative analysis: study and comparison of Big Data practices in other countries and their adaptation to the Uzbek context.

- SWOT analysis: identification of strengths, weaknesses, opportunities, and threats in the implementation of Big Data technologies in the national education system.

Future Prospects

Considering current trends in digitalization and education reform, Uzbekistan has significant potential for implementing Big Data technologies. In the coming years, the following developments can be expected:

- Development of national educational platforms that collect data on student performance, attendance, and activity;

- Creation of a unified educational analytics system to identify knowledge gaps, forecast academic outcomes, and optimize curricula;

- Implementation of adaptive learning, where content is personalized based on individual student data;

- Improved decision-making at ministries, universities, and schools based on real-time analytics;

- Development of professional competencies among educators and administrators for interpreting and applying educational data.

Recommendations for Effective Big Data Implementation in Education

- Develop a national strategy for education data analytics. Big Data's role should be defined within the state digital education strategy, setting goals, priorities, and performance indicators.

- Establish a legal framework. Regulations for collecting, storing, and using educational data must address privacy and personal data protection.

- Invest in digital infrastructure. Educational institutions must have access to high-speed internet, modern servers, storage systems, and analytical software.

- Train and retrain personnel. Professional development programs are needed for educators and administrators in data literacy, EdTech, and data analytics.

- Foster cooperation with the private sector and international organizations. Involvement of IT companies and international partners can accelerate the adoption of advanced solutions.

- Pilot projects and model testing. Start with pilot programs in selected regions or universities to assess effectiveness before wide-scale implementation.

Application of Big Data in Education in Uzbekistan: Practical Examples.

1. National electronic platform "my.edu.uz"

– **Data Collection:** The platform accumulates data on student performance, attendance, and the activity of both students and teachers.

– **Data Analysis:** Analytical algorithms are used to identify underperforming students and to personalize learning.

– **Example:** If a student regularly fails to complete homework, the system may recommend additional materials or a consultation with a teacher.

2. Centralized university admission system (admission.edu.uz)

– **Big Data** is used to analyze:

- the popularity of academic programs;
- the average scores of admitted students;
- the geographical distribution of applicants.

– **Example:** Based on this data, the government can adjust quotas and funding for the most in-demand specializations.

3. "Digital Education" project by the Ministry of Preschool and School Education

– **Goal:** Implementation of electronic gradebooks, diaries, and digital reporting.

– **Big Data is used for:**

- monitoring teaching quality;
- forecasting the level of education in different regions.

– **Example:** Analyzing regional disparities in exam results helps to direct support to underperforming schools.

4. Implementation of Learning Analytics in universities (e.g., National University of Uzbekistan, Tashkent State Technical University)

– Collecting data on attendance, activity in LMS, and academic performance.

– **Example:** Predictive analytics helps to identify students at risk of expulsion and take preventive measures.

5. Monitoring graduate employment

– **Big Data** is used in conjunction with data from the Ministry of Labor to:

- analyze the demand for certain professions;
- adjust educational programs.

– **Example:** If graduates from a certain major are not finding employment, the curriculum may be revised.

Conclusion

This study has shown that Big Data technologies have significant potential to transform Uzbekistan's education system. Their use can improve the quality of the educational process, personalize learning, enhance academic results, and support well-informed decision-making at all levels.

However, the current use of Big Data in Uzbekistan's education faces several challenges: limited digital infrastructure, shortage of data analysis specialists, inadequate legal support, and low digital literacy among educators. Nevertheless, there is political will and several initiatives aimed at education digitalization, providing a favorable foundation for further development.

It is recommended to develop a national strategy for Big Data analytics in education, create a unified system for collecting and analyzing educational data, and implement training programs in EdTech and data science. It is important to balance effective data use with protection of students' personal information.

Future research may focus on developing specific predictive analytics algorithms for educational institutions in Uzbekistan and evaluating the effectiveness of pilot Big Data projects.

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