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Effectiveness of Using Digital Tools in Education

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Abstract

This article analyzes the relevance of introducing digital technologies into the educational process, in particular the impact of learning management (LMS) platforms, online courses, AI and elektronic textbooks on educational effectiveness. Digital educational opportunities have such advantages as organizing the educational process in a person-oriented manner, establishing interactive communication between teachers and students, focusing on independent learning and strengthening control. At the same time, the need for technical infrastructure, pedagogical approach and development of digital literacy for their effective use is emphasized. The study identifies the role of LMS systems in improving the quality of education based on practical examples and analyses the effectiveness of using online educational tools based on statistical data. The results show that the complex integration of digital educational tools significantly increases students' motivation for learning, the level of knowledge acquisition and independent learning skills.

Keywords: Digital education, LMS, AI, online courses, e-books, educational technologies, distance learning, innovative education, MOOC.

Introduction

In today's globalization process, the education system is seen as a key strategic factor in the development of society. The digitalization of modern education and its organization on the basis of innovative technologies not only serves to improve the quality of education, but also plays an important role in the formation of digital competencies of the individual. Best practices adopted by education systems worldwide show that the use of digital technologies in the education system is one of the effective methods of organizing the educational process [1].

In recent years, the Republic of Uzbekistan has also been implementing a number of reforms to develop digital education infrastructure, widely introduce electronic resources, and establish distance learning. In particular, documents such as the "Digital Uzbekistan - 2030" strategy and the "State Program for Digitalization of the Education System" [2, 3] have created the legal basis for the widespread introduction of innovative technologies in the education sector. In this regard, the use of LMS (Moodle, HEMIS, Canvas, Google Classroom), online learning platforms (Coursera, edX, Udemy, etc.), artificial intelligence (ChatGPT, Gemini, Claude, Perplexity, Googlw AI), and various electronic textbooks is expanding. The scientific and practical significance of this article is that it is aimed at determining the effectiveness of digital educational tools in the learning process, analyzing their impact on students' learning motivation, quality of knowledge, and independent learning. The study, along with the advantages of LMS systems, online courses, artificial intelligence, and electronic textbooks, provides practical suggestions for their implementation and elimination.

Theoretical and Methodological Foundations of the Topic

The issue of using digital learning tools is one of the widely studied areas in modern educational theories. In this regard, constructivism, connectivism, and social learning theories serve as the main scientific and methodological foundations [4-7].

i). **Constructive Approach:** According to the theory of constructivism, knowledge is independently formed by a person during active learning (Piaget, 1973; Bruner, 1996). Digital learning tools such as LMS, artificial intelligence, and electronic textbooks create an environment that forms the construction of personal knowledge. Because they allow students to actively acquire knowledge based on experience, rather than passively receive it.

ii). **Connectivism Theory:** The theory of connectivism, put forward by G. Siemens (2004), is one of the scientific foundations of digital education. In this theory, knowledge is transmitted in global information networks, and the learning process takes place through connections with various digital resources. The use of LMSs and online courses implements this principle - students integrate knowledge from different sources.

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iii). **Social Learning Theory:** Bandura's (1986) social learning theory recognizes cooperation, communication, and sharing of experiences as important factors in the learning process. Digital learning tools, in particular forums, chats, and collaborative tasks in LMS systems, are consistent with this approach.

The role and pedagogical possibilities of LMS, online courses, artificial intelligence and electronic textbooks in education

The widespread popularity of digital educational tools has brought educational technologies to a new level. In particular, LMS (Learning Management System) systems, online courses, artificial intelligence and electronic textbooks have entered educational practice as important tools for organizing, controlling and developing the educational process [8].

The Role of LMS Systems

As learning management systems, LMS allows you to automate the processes of planning lessons, submitting assignments, conducting tests, evaluating and providing feedback [9]. Currently, platforms such as Moodle, Canvas, Blackboard, Google Classroom, Edmodo can be cited as examples of LMS systems that are widespread around the world.

Advantages of LMS Systems

- Students' learning activities can be monitored;
- Education is personalized;
- There is a feedback mechanism;
- Allows for distance learning;
- Allows you to independently study science at any time and from any place.

The organization of the educational process based on Moodle, HEMIS and Google Classroom is also widely implemented in higher education institutions of Uzbekistan. However, the effectiveness of using these systems directly depends on the digital literacy of teachers and students.

The Role of Online Courses in Education

Online courses (MOOC - Massive Open Online Courses) have become an integral part of the global education system today [10-12]. Among them, platforms such as Coursera, Udemy, edX, MitEdu, Khan Academy are among the most popular. Online courses increase the openness and popularity of education for all.

Their Advantages Include the Following:

- Global access to educational resources;
- Development of independent learning;
- Education focused on skills and qualifications;
- Student-friendly learning pace;
- Opportunity to obtain certificates or diplomas.

Online courses strengthen students' independent learning skills and direct them to the principle of lifelong learning.

The Importance and Advantages of Artificial Intelligence Tools

The development of artificial intelligence technologies in the world, including in our republic, is creating a regulatory framework for its application in various fields, in particular, in education. In particular, “conducting fundamental and applied scientific research in the field of artificial intelligence, forming a scientific ecosystem for the development of digital technologies” is defined as one of the main tasks. Based on these tasks, the possibilities of improving the content of subjects related to “Information Technologies and Systems” in higher education, and “Informatics and Information Technologies” in general secondary education based on artificial intelligence elements, and developing a didactic model and proprietary methodology based on hybrid technologies for teaching artificial intelligence elements are expanding.

The Following are the Advantages and Possibilities of Artificial Intelligence Tools:

- Using machine learning in the educational process;
- Implementing deep learning in education;
- Using natural language processing in the language learning process;
- Use of artificial intelligence in teaching robotics and expert systems in higher education;
- Use of artificial intelligence tools related to fuzzy logic and computer vision in teaching special subjects;
- Automation of the programming process;
- Establishment of the use of AI-assistants by professors and teachers, etc.

The Importance of Electronic Textbooks

Electronic textbooks (e-books) are more interactive than printed textbooks and are enriched with multimedia elements. Motion graphics, video annotations, 3D models, audio commentary make the learning process interesting and effective. As pedagogical advantages of electronic textbooks, we can list the following [10]:

- Educational materials are visualized;
- Information is updated quickly;
- The learning process is interactive;
- Creates a convenient platform for the teacher and student.

Research Methodology

This study is of practical importance and was aimed at determining the impact of LMS systems, online courses, artificial intelligence and electronic textbooks on students' learning motivation and learning outcomes. The following scientific methods were used during the study:

- **Analysis and Synthesis:** Study of scientific sources, Internet and social network sources, pedagogical and psychological literature;
- **Survey:** Questions related to the topic being studied were distributed via Google Forms to determine students’ opinions;
- **Observation:** The online learning process was analyzed in different groups;
- **Statistical Analysis:** The percentage comparison method was used to process the results.

The study was conducted at the Department of Information Technologies, Faculty of Mathematics and Economics, Renaissance University of Education in the 2025–2026 academic year. A total of 164 students participated in the survey. The survey was organized in the following areas:

- The level of use of learning management (LMS) platforms among students;
- Students’ attitude to online courses;
- The state of use of artificial intelligence tools;
- The effectiveness of using electronic textbooks;

- The impact of digital learning tools on learning motivation;
- The formation of independent learning skills and the means by which they are implemented.

Research Results and Discussions

Data Analysis Shows that:

- Electronic textbooks are the most commonly used tool among students (74%). Therefore, the creation of new electronic textbooks, educational and methodological manuals in Uzbek and Russian for students and their placement on the university's digital platform of electronic textbooks and manuals is an urgent task;
- LMS platforms are also actively used (68%), which indicates their necessity in the educational process and the need to update the information in them;
- The use of online courses is very low (4%), which indicates the need to develop the methodology and culture of using global educational resources among students.
- The level of use of artificial intelligence in the process of learning and mastering subjects is 25%. Therefore, it means that students need to be taught from which AI source to obtain information on the topics being studied.
- These results and the logical reasoning behind the presented digital learning tools show that:
- Online courses are the most motivating for students to learn independently;
- LMS systems are the most effective tools for feedback and monitoring;
- Artificial intelligence tools are an important tool used for independent learning and feedback;
- Electronic textbooks are useful as a supplementary learning resource, but are limited in terms of interactivity.

The results of the study show that the integration of digital learning tools into the learning process increases the effectiveness of education and increases students' motivation to learn. However, the successful organization and implementation of this process requires a combination of pedagogical and technological approaches.

1. The Impact of LMS Systems on Education

LMS platforms serve as the main tool for the systematic organization and management of students' educational activities. According to the results of the study, LMS systems are highly effective in monitoring the learning process, posting assignments, conducting online tests and providing feedback. At the same time, in order to fully utilize the capabilities of these systems:

- It is necessary to improve the qualifications of professors and teachers in digital pedagogy;
- It is necessary to adapt the interface of LMS systems to the national education system;
- It is necessary to expand the national database of electronic resources in subjects across all disciplines.

2. The Role of Online Courses in the Educational Process

Online courses give students freedom of choice and serve to develop modern professional competencies. For example, in most educational institutions, students are effectively using international online courses in areas such as programming, business administration, computer graphics, and artificial intelligence. However, there are the following problems in integrating online courses into the curriculum:

- Lack of official recognition of certificates and diplomas;
- The discipline of successfully completing courses is quite low;
- The presence of a language barrier due to the predominance of English content in original online courses.
- To solve these problems, it is urgent to create local MOOC platforms and develop local content in the conditions of Uzbekistan.

3. The Impact and Role of Artificial Intelligence Tools on the Educational Process

As a result of the development of modern digital technologies, in particular, the rapid development in the field of artificial intelligence, transformation processes are being implemented in education based on innovative approaches. The UNESCO “Strategy for Technological Innovation in Education” states the need to include artificial intelligence technologies in the content of curricula, the “Beijing Consensus on Artificial Intelligence and Education” states the need to introduce artificial intelligence into education, teach and use it, and practical work is being carried out to improve the methodology for teaching artificial intelligence in educational institutions. In the context of education and research in Uzbekistan and around the world, the use of artificial intelligence technologies in educational institutions is being used to develop students' knowledge and skills in digital technologies. In Chinese schools, the basics of artificial intelligence are taught, and in the United States, computer science is taught in an integrated manner with topics based on artificial intelligence, and in South Korean schools, scientific research is being conducted to improve the elective subjects “basics of artificial intelligence” and “mathematics of artificial intelligence”. It is necessary to conduct large-scale scientific and practical research to expand the didactic possibilities of integrating new disciplines such as artificial intelligence-based programming (wibe-coding), principles of artificial intelligence, and ethics of artificial intelligence into the education system.

4. Didactic Possibilities of Electronic Textbooks

Electronic textbooks are an important source of knowledge, allowing students to receive independent education at any time. However, electronic textbooks are often in the form of simple text files in pdf format, and they lack interactive elements. To increase the effectiveness of electronic textbooks:

- It is necessary to create multimedia e-textbooks (using video, animation, 3D models);
- Electronic textbooks should be enriched with interactive exercises and tests;
- It is recommended to adapt electronic textbooks to mobile devices.

A general analysis of digital educational tools showed that:

- LMS is an effective tool for managing education;
- Online courses - suitable for skill development and independent learning;
- Artificial intelligence tools - have the ability to obtain the necessary knowledge and supplement information about it and are a very good tool for independent learning in the current era;

- Electronic textbooks - are a convenient tool for reading, learning and mastering knowledge.

Conclusions and suggestions

The results of the above-mentioned scientific and practical research show that digital educational tools - LMS systems, online courses, artificial intelligence tools and electronic textbooks - are an important factor in increasing the efficiency of the educational process. They not only facilitate the management and organization of education, but also increase students' motivation for the educational process, form independent learning skills and serve to develop digital competencies.

Based on the Research, the Following Conclusions were Drawn:

- LMS systems were found to be the most effective digital tool for planning, monitoring and providing feedback on the educational process;
- Online courses (MOOC) enhance students' independent learning activities and create great opportunities for the formation of modern professional skills;
- Artificial intelligence tools (AI) are convenient and suitable for independent learning and deeper study of science;
- Electronic textbooks help to read and master educational materials and to deeply master the subject, but their interactive capabilities need to be further improved.
- As a result of the use of digital educational tools, it was observed that students' mastery indicators and interest in studying subjects increased.
- The digital literacy of teachers, the availability of technical infrastructure and methodological guides are decisive factors in the digitalization of the educational process.

Based on the Study, the Following Proposals are Put Forward:

At the Level of Educational Policy:

i). When developing a digital education strategy, it is necessary to mandatory integrate LMS, MOOCs, artificial intelligence and electronic textbooks into the educational process;
ii). It is important to create a single national LMS platform for universities and further develop existing ones;
iii). Certificates obtained through online courses should be integrated into the credit-module system.

At the Level of Higher Education Institutions:

i). Each department should form its own digital e-learning resources;
ii). It is necessary to improve the skills of professors and teachers in creating digital educational content;
iii). A technical support service for distance learning should be established for students.

Methodological Recommendations:

i). Electronic textbooks should be enriched with interactive multimedia elements based on digital educational tools;
ii). The quality of feedback in LMS systems should be improved and strengthened;
iii). A fair online assessment system should be developed.

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