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INTELLIGENT EDUCATIONAL TECHNOLOGIES: INDEPENDENT STUDY PRACTICES OF UNIVERSITY STUDENTS

Abstract. The study examines the use of intelligent educational technologies to support independent learning among university students. Attention is paid to what digital tools students use, how actively they use them in the learning process, and how much this contributes to their academic autonomy. The study was conducted among students from various faculties of M. Utemisov West Kazakhstan University. Data collection methods were used to determine students' preferences in using digital educational technologies and their perception of the effectiveness of these tools for independent learning. The results showed that students actively use digital technologies to search for information, complete educational assignments, and communicate with teachers and other students in a group. However, it was found that not all students are aware of the potential of digital educational tools for independent organization of the educational process, and many use them only as required by teachers. The interview results also showed that students increasingly rely on collaborative forms of work with digital technologies, such as online discussions, group projects, and collaborative editing of documents, while individual work with digital resources often remains limited. This highlights the need not only to improve students digital literacy, but also to develop their skills in independently managing educational activities using digital tools. Thus, the study confirms that in order to improve the effectiveness of students' independent learning, it is necessary not only to expand access to digital resources, but also to develop students' skills in using them consciously and purposefully for educational purposes.

Keywords: independent learning, digital technologies, education, intelligent educational technologies.

Introduction

The modern era is characterized by the rapid development of information and communication technologies, as well as the era of digital transformation. The field of education is also undergoing significant changes, integrating new technologies to enhance the effectiveness of the learning process. The advancement of intelligent educational technologies is playing a crucial role in reshaping students' perspectives on learning and improving teaching methodologies. These technologies provide students with quick access to information, the ability to conduct independent research, explore study materials in greater depth, and personalize their own learning trajectories.

The use of digital technologies in the learning process not only complements traditional methods but also contributes to the emergence of new pedagogical approaches. Today, various online platforms, digital resources, AI-based applications, and other innovative tools are widely utilized to develop students independent learning skills. However, the effectiveness of these technologies directly depends on how accurately and purposefully students apply them.

Students engagement in using digital tools directly impacts their level of independence in the learning process. Those with strong self-directed learning skills actively search for information, analyze data, and draw their own conclusions using digital platforms. However,

many students primarily use digital technologies only to complete assignments given by teachers, without fully exploring their potential. This, in turn, may hinder the development of students' academic independence.

Moreover, research shows that students use digital technologies in different ways. While some prioritize independent work, others prefer collaborative activities such as group projects, online discussions, and shared document editing tools. These differences are influenced by students learning styles and their strategies for using digital tools. Therefore, teaching students how to effectively utilize digital technologies and fostering their self-directed learning skills remain key priorities.

This study provides a comprehensive analysis of the use of intelligent educational technologies by students at M. Utemisov West Kazakhstan University. The primary objective of the research is to assess students' engagement with digital tools, examine their impact on learning independence, and propose effective strategies for optimizing the educational process in a digital environment. Additionally, the study explores students' digital literacy, their proficiency in utilizing online learning platforms, and their inclination toward developing personalized learning trajectories.

Exploring this issue contributes to improving the integration of digital technologies into the education system, enhancing students self-learning skills, and increasing their academic performance. Moreover, the effective use of digital tools plays a crucial role in students' future professional careers. Therefore, the efficient implementation of intelligent educational technologies remains one of the key priorities in modern education.

Materials and Research Methods

Self-directed learning is a process in which students take responsibility for planning, monitoring, and evaluating their own learning activities. This process includes goal setting, information searching and analysis, self-regulation, and the development of critical thinking skills. In today's context, self-directed learning has become an essential part of the education system, as it helps students adapt to the rapidly changing demands of the labor market and fosters lifelong learning capabilities.

In traditional teaching models, the teacher plays a central role in the educational process. However, with the digital transformation of education, students need to develop skills for independently acquiring new knowledge, working with information, and critically evaluating it. Self-directed learning requires a high level of motivation, discipline, and time management, which can be challenging without adequate support and resources (Baimenova et al., 2022)..

In this regard, digital educational technologies provide new opportunities for effective self-directed learning. They ensure access to up-to-date information, enable interaction with digital materials, automate the learning process, and offer instant feedback. The integration of digital solutions into education fosters students' independence, increases their engagement, and allows them to learn at their own pace (Mausymbayev, 2022).

Modern digital educational technologies encompass a wide range of tools, including online courses, virtual assistants, educational platforms, intelligent feedback systems, and other AI-based solutions. These technologies not only facilitate access to knowledge but also help structure the learning process, making it more personalized and efficient (Berberyan et al., 2022).

The primary functions of digital educational technologies in self-directed learning are aimed at simplifying the learning process, increasing efficiency, and personalizing education. Let's explore these functions in more detail:

1. Supporting the Learning Process. Digital technologies help students better absorb knowledge by presenting educational materials in various formats. These include video lessons, interactive models, simulations, virtual labs, and audio materials. Such methods are often more accessible and easier to understand compared to traditional text-based learning materials.

Additionally, AI-powered learning systems can provide personalized explanations based on students' proficiency levels, making complex topics more comprehensible.

2. Developing Research Skills. In today's education system, the ability to work with information is essential. Digital technologies enable students to quickly find, process, and analyze relevant data. Online databases, scientific article repositories, search engines, and AI-powered tools facilitate research activities. Additionally, these technologies enhance students' ability to collect, compare, and critically evaluate data. This, in turn, helps develop their research skills and strengthens independent thinking abilities (Cassandra et al., 2025).

3. ***Providing Feedback.*** Digital educational technologies allow students to receive real-time feedback through online tests, automated grading systems, and AI-based grammar and style correction tools. These technologies quickly identify mistakes and suggest ways to correct them. Additionally, they help reduce the workload of educators while enabling personalized feedback for each student.

4. ***Personalizing Learning.*** Since each student has a unique learning pace, proficiency level, and individual needs, digital technologies enable a more personalized educational experience. Adaptive learning systems tailor educational content based on a student's knowledge level, adjust task complexity, and provide targeted resources. This approach not only enhances comprehension but also boosts motivation and fosters a greater interest in self-directed learning (Bespalov et al., 2025).

Digital educational technologies play a crucial role in organizing an effective self-directed learning process for students. By supporting learning, developing research skills, providing instant feedback, and personalizing education, these technologies make the learning process more modern and accessible. When used correctly, they enable students to deepen their knowledge and enhance their creative thinking abilities.

One of the key elements of digital learning is the ability to adapt educational materials to students' learning preferences. Artificial intelligence facilitates personalized learning paths by adjusting the complexity of assignments and educational resources based on the 's preparedness level (Stosic et al. 2025).

For example, if a student struggles with a particular topic, intelligent tutoring systems can provide additional explanations, suggest interactive exercises, or offer similar problems to reinforce the material (Sidorov, 2022). Virtual assistants, such as chatbots and voice assistants, can explain complex concepts in simple terms and provide visual examples, making the learning process more accessible and easier to understand.

The use of intelligent educational technologies has a significant impact on the learning process. While they enhance learning efficiency, they also introduce certain limitations and challenges. Let's take a closer look at the key advantages and potential drawbacks of these technologies.

Intelligent educational technologies play an increasingly important role in modern learning environments, offering a wide range of benefits for students. One of their key advantages is the facilitation of self-directed learning. These technologies enable students to independently engage with educational content and effectively master learning materials. In particular, personalized learning approaches allow learners to select content based on their individual knowledge level, needs, and pace of study. Artificial intelligence tools further support this process by explaining complex concepts, providing interactive learning formats, and partially automating learning activities. As a result, the educational process becomes more time-efficient, flexible, and engaging.

Another significant advantage is the expansion of access to educational resources. Online platforms, AI-driven learning systems, and digital libraries provide students with the opportunity to access information anytime and from any location. This flexibility is especially

valuable for self-directed learning and lifelong education, enabling students to go beyond the constraints of traditional classroom instruction (Chen et al., 2021).

In addition, intelligent technologies contribute to more effective monitoring and assessment of the learning process. Automated grading systems, adaptive learning platforms, and analytical tools allow for continuous tracking of student progress. These systems help identify individual learning gaps and adjust educational strategies accordingly, thereby improving learning outcomes and supporting continuous academic development.

Despite these advantages, intelligent educational technologies also present several challenges. One of the primary concerns is the potential over-reliance on such tools, which may hinder the development of students' critical thinking skills. When learners excessively depend on AI to complete tasks, their ability to independently analyze information, evaluate alternatives, and make informed decisions may be weakened.

Another important limitation is related to the reliability of AI-generated information. Although such technologies provide rapid access to content, the accuracy and validity of this information are not always guaranteed. Without proper critical evaluation and verification, students may rely on incorrect or misleading data, which can negatively affect the quality of their learning outcomes (Huapaya et al., 2025).

Academic integrity also represents a significant concern. Intelligent technologies may be misused by students not as tools for learning, but as a means of generating ready-made answers, essays, or coursework. Such practices can undermine the educational process, reduce genuine knowledge acquisition, and limit the development of critical and creative thinking skills (Miletic et al., 2025).

Finally, psychological and motivational aspects should be taken into account. Digital learning environments are not equally suitable for all students. Some learners demonstrate a preference for traditional instructional methods, and the use of digital platforms may introduce additional stress or reduce motivation. This, in turn, may negatively affect student engagement and overall learning effectiveness.

Table 1.

Advantages and Disadvantages of Intelligent Educational Technologies

Advantages	Disadvantages
Personalized learning	Reduced direct interaction with teachers
Saves time and resources	Uncertainty about information accuracy
Develops self-learning skills	Issues of plagiarism and academic integrity
Fast feedback	Technical difficulties
Accessibility	Decreased motivation

Intelligent educational technologies play a significant role in enhancing students self-directed learning processes. However, their effectiveness depends on how and for what purpose they are utilized. Therefore, special attention should be given to improving students' digital literacy, developing critical information analysis skills, and maintaining academic integrity. A balanced and thoughtful integration of these technologies can enhance learning quality and contribute to students' intellectual growth.

Research Methodology and Results

In the context of the rapid integration of digital educational technologies and artificial intelligence (AI) tools into higher education, their role in shaping students' self-directed learning has become increasingly significant. Accordingly, the present study aims to examine the extent to which students utilize digital and AI-based tools and to assess their impact on independent learning practices.

The empirical research was conducted among students of M. Utemisov West Kazakhstan University, with a total sample of 120 participants. The study focused on analyzing students' engagement with digital technologies within their individual learning trajectories, as well as evaluating their perceived effectiveness in supporting autonomous learning.

To ensure a comprehensive analysis, a combination of research methods was employed. A survey questionnaire was used to determine the frequency and patterns of students' use of digital and intelligent educational technologies. In addition, qualitative analysis was applied to interpret students' perceptions, attitudes, and experiences related to the use of these tools in self-directed learning. Furthermore, statistical analysis was conducted to process the collected data, identify trends, and validate the obtained results.

The survey was designed to assess the extent to which students utilize intelligent educational technologies including digital platforms, artificial intelligence tools, and online learning environments in their independent learning activities. It also aimed to explore students' perceptions of these technologies, their perceived impact on academic performance, and the challenges encountered during their use.

The objectives of the study included determining the frequency of technology use among students, evaluating its impact on academic performance, identifying challenges associated with the use of intelligent tools, analyzing their influence on independent learning processes, and developing practical recommendations for their effective integration into university education.

The findings indicate that intelligent educational technologies have a substantial impact on students' independent learning practices. Among the respondents, 88.7% reported actively using digital and AI-based tools, which reflects a high level of adaptation to the digital learning environment. The majority of students perceive these technologies as more convenient and efficient compared to traditional instructional approaches. Key factors influencing this preference include ease of access to information, time efficiency, and enhanced clarity in understanding learning materials.

These results demonstrate that digital and intelligent technologies are becoming an integral component of modern educational practices, contributing to the development of students' autonomy, flexibility, and engagement in the learning process.

Survey results revealed that 74.5% of students use online courses for self-directed learning. Platforms such as Coursera, Udemy, and Stepik are widely utilized to acquire additional knowledge and explore topics beyond the university curriculum. The appeal of online courses lies in their interactivity, incorporating video lectures and assignments to make the learning process engaging and accessible. However, some students reported not completing these courses in full. The primary reasons cited include lack of time, the complexity of course materials, and the fact that some courses require payment. Additionally, the predominance of English-language courses poses challenges for certain students.

A total of 67.4% of students reported that artificial intelligence (AI) tools are useful for completing written assignments, processing information, and conducting research. Tools such as ChatGPT, Grammarly, and QuillBot are primarily used for text verification, editing, and content expansion. While these tools contribute to improving students' writing skills, some have encountered difficulties in critically evaluating AI-generated suggestions. Additionally, 35.8% of students expressed concerns about AI posing risks to academic integrity, while 41.3% questioned the reliability of AI-generated information. In some cases, AI tools provided inaccurate or misleading data, highlighting the importance of developing students' ability to work with credible sources.

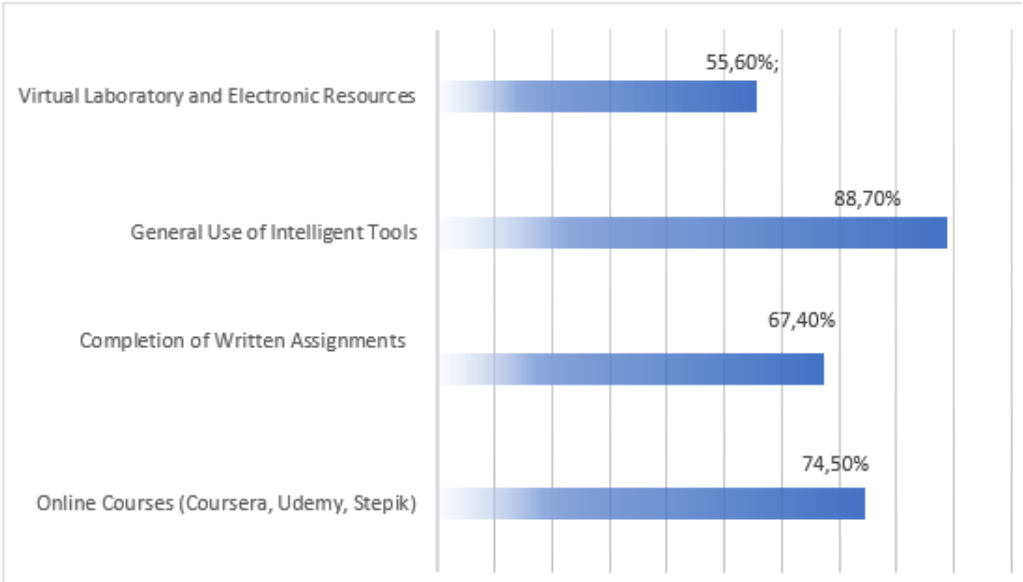
According to the research findings, 55.6% of students highlighted the significant role of virtual laboratories and electronic resources in their research activities. These tools are particularly valuable for students in natural sciences, engineering, and medicine, as they offer

new opportunities for practical learning. Virtual laboratories provide a safe and accessible environment while reducing the need for real-world experiments. However, these tools may not be equally effective for all students, as some laboratory programs have complex interfaces or require a certain level of prior knowledge.

The issue of verifying information accuracy remains highly relevant. According to the survey results, 44% of students reported difficulties in assessing the reliability of information obtained from the internet. This challenge becomes particularly significant when working with large volumes of data. Artificial intelligence tools cannot independently verify the authenticity of the information they provide, while students' ability to distinguish between credible academic sources and unverified information is not always strong. Therefore, universities should organize specialized training sessions on information literacy. Mastering data verification methods, utilizing reliable academic databases, and adhering to principles of academic integrity are crucial factors that will contribute to students' ability to acquire high-quality education in the future.

Picture 1.

Utilization of Intelligent Educational Tools by Students.



Overall, the survey results indicate that intelligent technologies have a positive impact on students' learning processes. However, several measures need to be implemented to maximize their effectiveness. Universities should organize specialized courses to enhance digital literacy and develop methodologies for the proper academic use of AI tools. Additionally, providing students with free or discounted access to online courses is crucial. By implementing these measures, intelligent educational technologies can significantly contribute to the development of students' creative thinking skills and improve their academic performance.

Discussion

Analyzing the research findings allows us to draw several key conclusions regarding students' experiences with and the effectiveness of intelligent educational technologies. First, the majority of students actively use digital resources for independent learning. This trend highlights a shift away from traditional teaching methods toward a more flexible and self-directed learning model. Digital education platforms and AI-powered tools enable students to go beyond textbooks, engage with supplementary materials, conduct independent research, and enhance their creative thinking skills.

However, it cannot be said that the widespread use of technology has only positive effects on students. The research revealed that some students face difficulties in mastering new digital tools. This issue is particularly relevant for those with limited technical knowledge or those who require additional time to adapt to new programs. Additionally, maintaining motivation in a digital learning environment remains a crucial factor. For students with lower levels of self-discipline, the flexible learning format can sometimes lead to decreased productivity.

Although AI tools offer students numerous opportunities, they also pose the risk of reducing personal responsibility. Some students may become overly reliant on AI assistance, neglecting the development of independent thinking skills. This can raise concerns about academic integrity and negatively impact the quality of the learning process. Therefore, it is essential to cultivate a responsible approach to working with AI, encouraging students to verify information accuracy, enhance their analytical thinking skills, and make independent decisions.

Moreover, the use of intelligent technologies by students is significantly influenced by their field of study. For instance, students in technical and natural sciences frequently utilize virtual laboratories and programming tools, whereas those in humanities tend to rely more on text-processing software and online courses. This highlights the need to adapt educational content to the specific requirements of different disciplines.

In conclusion, intelligent educational technologies significantly expand students' opportunities for independent learning. However, to enhance their effectiveness, universities should introduce specialized courses and methodologies aimed at developing digital literacy. Additionally, it is crucial to educate students on the responsible use of new technologies, foster their ability to critically evaluate information, and uphold academic integrity principles. When these aspects are taken into account, intelligent technologies can improve the quality of education and contribute to the professional competency of future specialists.

The conducted research results have demonstrated that intelligent educational technologies significantly influence students' independent learning processes. Today, digital technologies and artificial intelligence tools are increasingly integrated into the education system, complementing traditional teaching methods. This shift has introduced substantial changes in students’ learning skills, information processing approaches, and self-directed learning strategies.

The research revealed significant differences in the level and purpose of intelligent technology usage among students from various faculties. Humanities students primarily enhance their knowledge through online courses, e-books, and academic articles, while technical students frequently utilize artificial intelligence tools and digital laboratories for programming, modeling, and analysis. These variations reflect the specific needs associated with their respective fields of study.

The research findings indicate that students have a high level of trust in intelligent technologies. Many students noted that artificial intelligence helps them grasp complex topics more quickly and encourages independent research. Additionally, intelligent technologies facilitate effective time management, streamline the learning process, and enable the creation of personalized learning trajectories. This is particularly crucial for students engaged in distance learning and academic mobility programs.

However, the study also identified several challenges. Not all students can effectively utilize intelligent tools, and some participants reported facing technical difficulties while using them. Additionally, excessive reliance on artificial intelligence may reduce creativity and independent inquiry among certain students. The need to assess the reliability of information also emerged as a significant issue, as AI-generated data is not always accurate or trustworthy.

Moreover, some students expressed concerns about the impact of intelligent technologies on academic integrity. The ability to obtain ready-made answers through artificial intelligence or complete assignments using automated tools may negatively affect the quality of education.

Therefore, there is a growing need to enhance students' digital literacy, foster a responsible approach to AI tools, and uphold academic ethics.

Overall, it has been established that intelligent educational technologies enhance students' learning efficiency and improve their independent learning skills. To effectively integrate these technologies into the educational process, universities should strengthen methodological support and develop specialized training programs. Additionally, fostering dialogue between educators and students regarding the proper use of digital technologies is essential. The effective utilization of intelligent technologies contributes to the development of students' professional competencies and enhances their competitiveness in the job market.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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A. Kushekkaliyev: Conceptualization, Writing Original Draft Preparation. G. Khazhgaliyeva: Conceptualization, Writing Original Draft Preparation, Translation. O.Dadaboyeva: Writing Original Draft Preparation, Translation. G. Kismetova: Conceptualization, Data Processing, Data Curation. Zh. Kenzhin: Validation, Formal Analysis, Data Visualizations. Kh. Kassenov: Writing Review & Editing

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