

Exploring the influence of modern technologies in education: Evaluating the effects of e-learning and remote instruction on academic performance



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Abstract The significance of strategic management in the tourism sector stems from its critical role in the economic and social development of nations. With escalating competition, evolving consumer trends, technological advancements, and external influences, strategic management has emerged as essential for the effective functioning of tourism enterprises. Examining various strategic approaches aids in identifying optimal strategies to attain competitive advantages. This article assesses the current landscape of the Ukrainian tourism sector, pinpointing its primary challenges. Emphasis is placed on the repercussions of the pandemic and Russia's full-scale invasion on Ukraine's tourism industry. These crises have precipitated a substantial decline in tourism revenues, alongside the deterioration of healthcare facilities and a notable exodus of skilled professionals. The study underscores key aspects of strategic management in tourism, including the adoption of innovative service approaches, maintenance of service quality, and establishment of partnerships with fellow players in the tourism market. Implementing these strategic approaches is poised to facilitate swift recovery, uphold competitiveness, and foster sustainable growth within the tourism industry.

Keywords: strategic management, strategic decisions, management, tourism, tourism business, development

1. Introduction

Recent technologies in education necessitate significant modifications in the learning process. The adoption of e-learning and distance education represents a primary trend in this evolution, offering improved access to knowledge and making learning more adaptable and effective (Batsurovska, 2021a; Batsurovska, 2021b; Batsurovska, 2018). In a world where technological progress is relentless, its impact on education is direct and transformative. The emergence of global challenges alongside the swift advancement of digital technologies demands a reevaluation of traditional pedagogical methods (Bilavych et al., 2021; Bondarenko & Vashchenko, 2021). Electronic technologies and virtual platforms have emerged as pivotal tools capable of revolutionizing the educational process by enhancing accessibility, flexibility, and efficiency (Borova et al., 2022; Dembitska et al., 2022). The challenges we face today revolve around acquiring new knowledge and evaluating, comprehending, and adapting to novel learning modalities. With the active integration of new technologies into the educational framework, assessing their impact on student performance has become increasingly crucial (Dolbysheva & Lutsenko, 2023; Fedorovych & Karpenko, 2021). This study aims to examine the efficacy of e-learning and distance education and explore how these innovative approaches influence student outcomes within the contemporary educational landscape.

This study aims to analyze current trends in applying modern technologies and assess the impact of e-learning and distance education on students' performance.

Research goals

1. To analyze the positive and negative aspects of e-learning and distance education.
2. Define the key directions of e-learning and distance education in the context of using modern technologies in the educational process, provide their features, and obtain and statistically verify the results of studies regarding the implementation of modern technologies in the educational process.



2. Literature review

After analyzing the scientific literature, it can be argued that scientists have studied some aspects of applying modern technologies in the educational process. Onkovych et al. (2021) focused on the latest educational technologies of modern media didactics. They appeared in the educational space due to the rapid development of information technology. Kademia et al. (2022) studied innovative teaching technologies. Dembitska et al. (2022) studied innovative distance learning technologies in higher education institutions. They also studied the current issues related to the necessity of developing pedagogical conditions for distance learning in higher education institutions.

Hlukhov and Pityn (2021) studied the concepts of a modern student education system at a university. The authors concluded that input information in the context of e-learning is a key factor in the concept. Bondarenko and Vashchenko (2021) focused on the training of future teachers via e-learning based on European and Ukrainian theoretical experience and practice.

Many researchers have also studied the impact of e-learning on students' academic performance in the context of distance learning. For example, Tymoshchuk (2021) studied the effects of distance learning on students' quality of life in different types of modern institutions. Shtepa and Kovalenko (2023) studied the issues of using distance educational technologies. Lysenko (2023) studied the organization of distance and blended learning on the MOODLE platform.

Moroz and Moroz (2021) focused on distance learning in higher education. Moroz (2022) emphasized that distance education is a component of society's digitalization. The author stressed that in the modern world, higher education allows a person to self-realize and succeed. Moreover, he believed that with a change in perspective, success means more than grades. It includes emotional, social, cognitive, and academic development.

Korets and Chumachenko (2020) studied the application of information and communication technologies for creating educational multimedia content for distance learning. Bilavych et al. (2022) studied the impact of education digitalization and distance learning on students' motor activity. Kuzminskyi, Kuchai, et al. (2022) studied the main aspects, features, and advantages of distance learning when training future specialists in higher education. Shyshenko (2022) studied the influence of digital technologies on the educational process at universities.

Batsurovska (2018) studied the development of massive open online courses in higher education. Oliynyk et al. (2021) analyzed the features of the information and educational environment for bachelor's education. Borova et al. (2022) addressed the challenges of hybrid learning, which includes e-learning. Batsurovska (2021) paid attention to the informational and educational environment for teaching general technical disciplines to bachelors in electrical engineering.

The authors also emphasized that in the context of e-learning, students' independent work is equally relevant. Fedorovych and Karpenko (2021) studied the organization of students' independent learning activities in higher education institutions. Pryadko (2023) focused on the current state of the individual work of university students in distance learning.

Yatsenko (2023) focused on the conceptual principles of assessing the quality of distance learning. The author noted that the development of technology and the requirements for education quality require higher education institutions to pay attention to distance learning quality so that they can meet modern challenges and remain competitive in the educational services market. Kozmenko (2019) focused on the problems of using assessment as a tool for assessing the effectiveness of the educational process of students, as well as their success in the learning environment of the educational institution.

Marchuk (2023) studied the quality of higher education in emergency conditions. The article reveals the opportunities and risks related to the digitalization of higher education and distance learning. Melnyk et al. (2023) evaluated e-learning courses as a quality educational tool. Plavčan et al. (2022) studied the digitalization of university education and its benefits and prospects.

However, the issue of using the newest technologies in the educational process and assessing the impact of e-learning and distance education on students' performance still needs to be explored.

3. Methods

Analytical method. Analysis of scientific literature, academic materials, and articles on the use and implementation of e-learning and distance education on students' performance.

Empirical method. Statistical data on students' academic performance in the control and experimental groups before and after the application of modern technologies in the educational process were collected for further comparative analysis.

Observation. Systematic observation of the learning process using new technologies to identify the peculiarities of students' interaction with the material and assess their activity.

Statistical analysis. Statistical methods were applied to calculate statistically significant differences in students' performance by using Pearson's χ^2 statistical criterion.

4. Results

Modern technologies in the educational process bring significant changes to learning methods. They provide students and teachers with unique opportunities. E-learning and distance learning are modern education methods based on digital knowledge transfer technologies. Students access learning materials, communicate with teachers, and meet learning

requirements using electronic platforms and online resources. Such learning methods provide flexibility in choosing the place and time of study. This is especially important in the current educational context (Lutsenko et al., 2022). Currently, the most common web services in Ukraine are Zoom, Google Classroom, ClassDojo, Kahoot, Tiki-Toki, Mindomo, etc., which are not only effective for creating multimedia and interactive content, but also provide convenient means for communication, visualization of educational materials, collaboration, and gamification of learning (Figure 1) (Bower & Torrington, 2020).

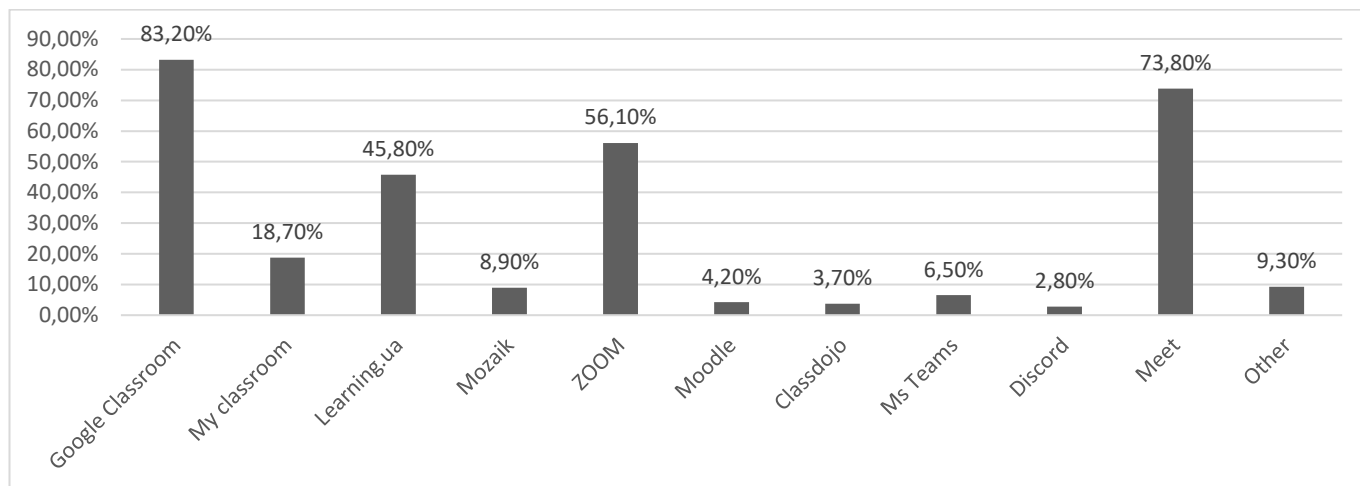


Figure 1 Modern technologies in the educational process.
 Source: Yakovleva (2022)

However, the implementation of such methods also poses challenges related to technical issues, motivation, and the need for effective interaction in the virtual learning space. Furthermore, the necessity to acquire digital skills within a brief duration is a significant drawback, as it leads to inefficiency in the educational process due to students' competence obstacles. The inadequacy of digital skills in the educational process hinders the efficacy of information assimilation. In addition, the need to acquire digital skills in a short time is a significant disadvantage, as it leads to inefficiency in the educational process due to students' competence barriers. These barriers arise due to a low level of digital skills, which hinders the efficiency of information assimilation in the educational process. Nevertheless, in recent times, a significant proportion of adolescents in Ukraine possess a consistent level of digital proficiency, which tends to increase (Figure 2).

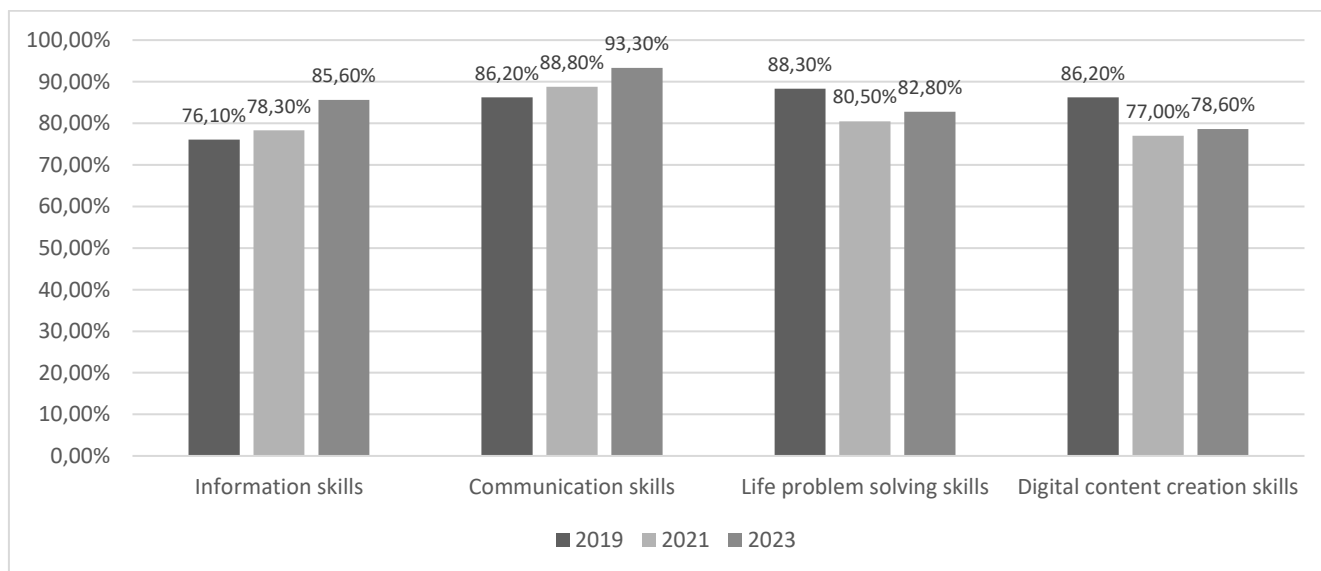


Figure 2 Dynamics of digital skills of adolescents in terms of competencies.
 Source: Ukraine (2023)

Now, let us look at the positive aspects of e-learning and distance education.

1. Flexibility in the schedule. The main advantage of e-learning is the ability to study at any convenient time. Flexibility in planning allows students to integrate the learning process with other aspects of life effectively.



2. Access to online resources. Students have broad access to educational resources online, which enriches the learning process. Electronic textbooks, video lectures, and interactive tasks contribute to a deeper understanding of the material.
3. International learning. E-learning and remote education provide an opportunity to study resources from different parts of the world. This allows students to become acquainted with different cultures and views, which can be valuable experiences.

Along with the positive aspects of e-learning and distance education, there are also some negative aspects.

1. The need for more personal interaction. One of the main disadvantages of e-learning is the limited direct contact between participants in the educational process. Personal communication helps individuals understand the material and develop communication skills.
2. Technical challenges. Network failures, software problems, and a lack of technical literacy can seriously hinder successful learning. Not all students may have the necessary skills or access to the required equipment.
3. The danger of a lack of motivation. Distance learning requires more self-discipline and motivation from students. The absence of external control can lead to a decrease in the level of diligence and, as a result, to a decrease in academic performance (Akimov et al., 2021).

Regarding the assessment of the impact of e-learning and distance education on students' performance, it can be noted that modern scholars need to be clearer in their conclusions about students' performance in this context. Studies have led to divergent conclusions: on the one hand, e-learning improves academic performance due to access to various educational resources (Mykhaylyova et al., 2023; Iatsyshyn et al., 2020; Buryk et al., 2023). On the other hand, it can also lead to deterioration due to limited interaction and a lack of students' motivation.

Notably, the success of introducing new technologies into the educational process depends on a balanced approach. It is possible to obtain both advantages and disadvantages, to provide students with sufficient opportunities for communication and interaction, and to provide high-quality technical support.

Table 1 outlines the key areas of e-learning and distance education in the context of using modern technologies within the learning process.

Table 1 Key areas and features of e-learning and distance education in the context of using modern technologies in the educational process.

Key areas	Features
E-learning and online platforms	The emergence of e-learning resources and online courses allows students to complete their education at a convenient time and place. The materials, such as videos, interactive tasks, and tests, enrich the learning process, making it more exciting and accessible.
Virtual and augmented reality	Virtual classrooms and labs allow students to immerse themselves in learning material, creating a more realistic perception of the subject. Augmented reality combines virtual and real elements to improve understanding of complex concepts.
Artificial intelligence in education	The use of machine learning algorithms to personalize the educational experience. Big Data analysis helps identify students' needs and optimize curricula.
Cloud technologies	Cloud platforms provide access to educational resources from anywhere in the world and on any device. Cooperation between students and teachers via the cloud facilitates the exchange of knowledge and experience.
Interactive whiteboards and devices	The use of interactive whiteboards in the classroom promotes more active interaction of students with the learning material. Devices that support personalized technologies allow students to adapt learning to their personal needs.
Mobile applications for training	Mobile apps allow students to learn on the go, significantly increasing their learning flexibility. Game elements in apps can make the learning process more engaging and motivating.
Blockchain technologies in education	Blockchain can be used to confirm student achievements, prevent fake diplomas, and create transparent grading systems.
Analytics tools for learning	Learning data analysis helps teachers and administrators effectively track student progress and make adjustments to curricula. The use of modern technologies in the educational process expands opportunities for the transformation of education in general. Education becomes flexible, accessible, and effective for both students and teachers.

The results of implementing modern technologies in the educational process were studied over 3 semesters. The experiment involved 372 students of technical, economic, and psychological specialties. The experimental group included 184



students, and the control group included 188. The data needed to evaluate the study were obtained from the results of the session control.

Before and after the experiment on implementing modern technologies in the educational process, the results were validated using Pearson's χ^2 statistical criterion for relative indicators. The results are illustrated in Tables 2 and 3.

Table 2 The results of students' educational process before the experiment: calculation of the empirical value of χ^2 based on the results of the entrance control.

Level	% (EG)	Empirical frequency n_i (EG)	% (CG)	Empirical frequency n_{i1} (CG)	$(n_i - n_{i1})^2$	$(n_i - n_{i1})^2 / n_{i1}$
A	2,17	4	2,13	4	0	0,00
B	5,43	10	4,79	9	1	0,11
C	26,63	49	27,13	51	4	0,08
D	46,74	86	46,28	87	1	0,01
E	15,76	29	15,96	30	1	0,03
FX	3,26	6	3,72	7	1	0,14
Total amount	100,00	184	100,00	188		0,38

The results of implementing modern technologies in the educational process were studied over 3 semesters. The experiment involved 372 students of technical, economic, and psychological specialties. The experimental group included 184 students, and the control group included 188. The data needed to evaluate the study were obtained from the results of the session control.

The empirical value is $\chi^2=0,38$. The critical value for the level of freedom is $v=5$. Let us determine the critical value for a given extent of freedom χ_{cr}^2 for the levels of statistical significance $\rho \leq 0,05$ i $\rho \leq 0,01$.

$$\chi_{cr}^2 = \begin{cases} 11,1; (\rho \leq 0,05) \\ 15,1; (\rho \leq 0,01) \end{cases}$$

$\chi^2_{emp} \leq \chi^2_{cr}$ means that there are no significant deviations between the distributions. This indicates the similarity of the educational results obtained between the groups of students.

Upon completion of the initial control, the latest technologies were introduced into the students' educational process. These include e-learning and online platforms, virtual and augmented reality, artificial intelligence, cloud technologies, interactive whiteboards and devices, mobile learning applications, blockchain technologies in education, and analytics tools for learning.

Table 3 Key areas and features of e-learning and distance education in the context of using modern technologies in the educational process.

Level	% (EG)	Empirical frequency n_i (EG)	% (CG)	Empirical frequency n_{i1} (CG)	$(n_i - n_{i1})^2$	$(n_i - n_{i1})^2 / n_{i1}$
A	5,98	11	2,66	5	36	7,20
B	14,67	27	5,85	11	256	23,27
C	30,43	56	25,00	47	81	1,72
D	44,57	82	47,34	89	49	0,55
E	3,26	6	15,43	29	529	18,24
FX	1,09	2	3,72	7	25	3,57
Total amount	100,0	184	100,00	188		54,56

The empirical value is $\chi^2=54,56$. The critical value for the level of freedom is $v=2$. For a given degree of freedom, let us determine the critical value χ_{cr}^2 for the levels of statistical significance $\rho \leq 0,05$ i $\rho \leq 0,01$.

$$\chi_{cr}^2 = \begin{cases} 11,1; (\rho \leq 0,05) \\ 15,1; (\rho \leq 0,01) \end{cases}$$

$\chi^2_{emp} \geq \chi^2_{cr}$. indicates that there are significant deviations between the distributions. This means that it belongs to the area of relevance. The implementation of modern technologies in the educational process is promising. It also has a significant impact on students' learning, providing personalization and differentiation of education (Figure 3). For example, interactive and multimedia materials available on online platforms make learning material more attractive to students. Furthermore, with the help of media, interactive approaches, and tools, teachers can introduce innovative teaching approaches, such as the use of case studies, research and development work, projects, and educational games. The result is better assimilation of information by students in an emotionally comfortable environment, retaining the desire to learn and create new knowledge and innovations (Brown et al., 2024).



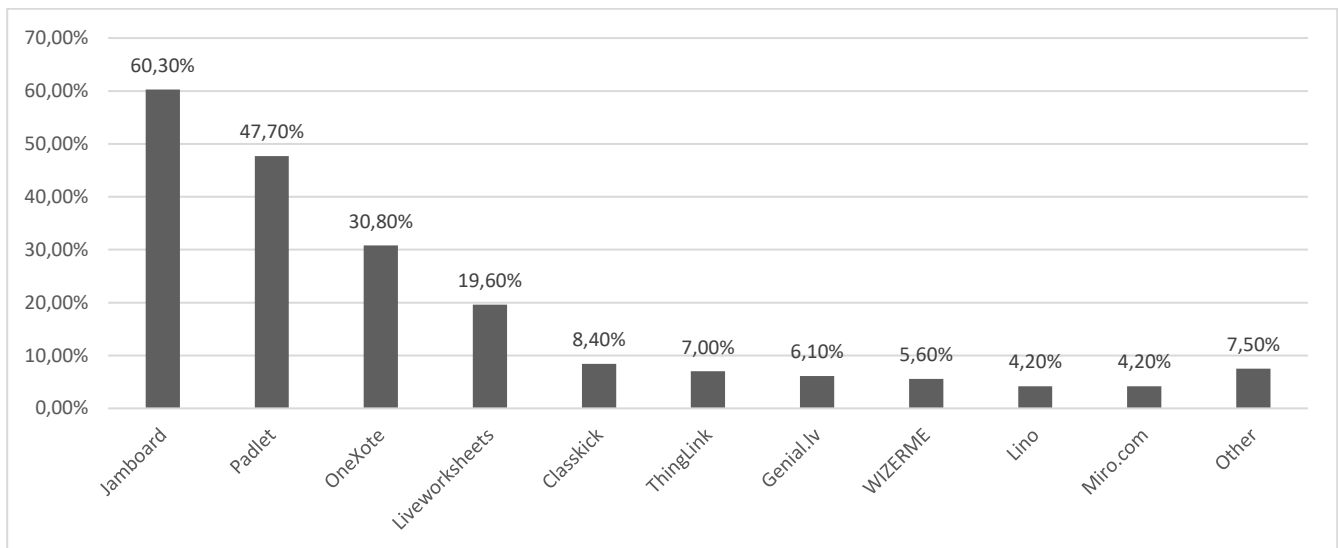


Figure 3 Interactive and multimedia materials in the educational process.

Source: Yakovleva (2022)

Virtual and augmented reality combine virtual and real elements. This enhances the student's perception of information in a spatial environment (Dolbysheva et al., 2023). Cloud-based platforms provide access to educational resources from anywhere in the world and on any device. It allows students to learn based on their personal trajectory. Interactive whiteboards and devices that support personalized technologies enable students to adapt learning to their individual needs, which increases their interest in learning. Mobile programs allow students to study on the go, which significantly increases the flexibility of learning. However, there are potential disadvantages to using interactive tools and problems associated with the gamification of education. One of them is limited communication between students, which leads to the insufficient development of social skills. Increased time spent working with electronic devices can have a negative impact on students' health, including visual impairment and physical inactivity. The extensive level of digital literacy required to utilize interactive tools may pose a hindrance for certain participants in the educational process. Additionally, game elements and gamification tools require significant material and time costs, which can complicate their implementation (Hnedina & Nahorny, 2023). In light of the advantages and disadvantages of modern technologies and gamification in education, it is essential to actively promote student motivation during the educational process. Another priority is to develop the digital skills of the lecturing staff of educational institutions in order to ensure consistency in presentation and enhance learning.

5. Discussion

The discussion of the assessment and adaptation of curricula to new technological realities raises the question of changes in the learning process that affect assessment systems and their correlation with the needs of the modern labor market. Data security and privacy are essential aspects of educational technology (Homon et al., 2022). The question of ensuring the protection of student data and the measures taken to prevent information leakage is a matter of debate. Critics often argue that technology's integration into education may result in diminished social interaction and essential communication skills. However, the study by Bilavych et al. (2021) on the influence of digitalization on educators' motor activity and health suggests that technology can also foster community and well-being in educational settings, challenging the notion that digital education necessarily detracts from social aspects of learning. The question of technological access and its impact on students from less advantaged backgrounds remains contentious. Studies such as those by Lutsenko and Dolbysheva (2022) and Moroz and Moroz (2021) discuss the broader implications of digital learning for physical activity and student perceptions, hinting at the necessity for equitable access to technology to ensure that all students benefit from digital education advancements. The assessment and adaptation of curricula to new technological realities touch upon the evolving needs of the modern labor market. For example, Borova, Ved and Zhang (2022) emphasize the formation of transversal competences in students through hybrid learning, illustrating a direct response to labor market demands for versatile skills. Privacy and data security in educational technology, as discussed by Homon et al. (2022), underscore the importance of safeguarding student information in the digital age. This concern aligns with debates on how educational institutions are adapting to protect students' data against the backdrop of increasing digitalization (Oliylyk et al., 2021). By addressing these issues, this discussion aims to deepen the understanding of the current landscape and help in formulating more effective strategies for implementing modern technologies in education. This approach leverages insights from a range of studies (Batsurovska, 2021; Dembitska et al. 2022;

Kuzminskyi et al., 2022; Bakhov et al., 2021), enabling a comprehensive analysis that not only supports but also challenges and expands upon the initial research findings presented in this study.

Discussions of these issues will allow for a better understanding of the current situation. These findings will help to formulate more effective strategies for implementing modern technologies in education

6. Conclusion

As a result, the implementation of modern technologies in the educational process, such as e-learning and distance education, significantly changes educational methods and expands the possibility of perceiving the material. It should be noted that learning with new technologies requires more self-discipline and motivation from students. A lack of control can lead to a decrease in the quality of learning.

However, the latest technologies provide unique tools that can transform the educational process, making it more accessible, flexible, and efficient. They include e-learning and online platforms, virtual and augmented reality, artificial intelligence, cloud technologies, interactive whiteboards and devices, mobile learning apps, blockchain technologies in education, and learning analytics tools. The results of the study on the implementation of modern technologies in the educational process were tested using Pearson's χ^2 statistical criterion.

There is no doubt that the introduction of new technologies in the educational process is quite promising.

For the effective application of modern technologies in the educational process, it is necessary to conduct further research focused on improving technical support and developing adequate assessment methods and motivational strategies.

Ethical considerations

Not applicable.

Conflict of interest

The authors declare no conflicts of interest.

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