OPEN ACCESS
Jurnal Ilmiah Ilmu Terapan Universitas Jambi
Vol. 9 No. 1. March 2025, pp. 422-440 DOI. 10.22437/jiituj.v9i1.38107
Research Article

EVALUATION OF INNOVATIVE TEACHING METHODS USING MODERN INFORMATION TECHNOLOGIES

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Article Info
Received: Oct 29, 2024
Revised: Dec 16, 2024
Accepted: Feb 13, 2025
OnlineVersion: Feb 18, 2025

Abstract
The aim of the study was to identify the effectiveness of innovative teaching methods using modern information technologies (IT) in four leading universities of Kyrgyzstan and Ukraine. The study was conducted on the basis of a SWOT analysis for each university. The selection of universities ensured comprehensive coverage of different types of educational institutions, from public to private. The data collected included a comparative analysis of the selected universities, as well as an assessment of the available digital platforms and technical support. The main results of the study were aimed at identifying the strengths, weaknesses, opportunities, and threats associated with the introduction of modern IT in the educational process. This allowed understanding which technologies and methods were most effective in improving the quality of education. A comparative analysis of universities helped identify general trends and specific challenges for each institution. In particular, Ukraine's educational system is characterized by a developed network of higher education institutions, the implementation of the Bologna system, and the active use of IT in education. It is determined that the educational system in Kyrgyzstan is developing, in particular in terms of the introduction of modern technologies, both in public and private universities. The study formulates recommendations for improving the use of modern IT in teaching, in particular, for teacher training and attracting additional resources. The results of the study can be used for further development of the country's educational system, with a focus on innovative approaches in selected universities in Kyrgyzstan and Ukraine.

Keywords: Education, Modern Requirements, Opportunities and Threats, Platforms, Progressive Methods.

INTRODUCTION

The study of the topic of evaluating innovative teaching methods using modern information technologies (IT) at universities in Kyrgyzstan is an important area of research today. The modern world is rapidly changing under the influence of technology, and education is no exception. The use of IT in teaching can not only improve the quality of education but also make it more accessible to a wide range of students, especially in the context of distance learning, which has become relevant during the COVID-19 pandemic. Therefore, studying the effectiveness of these methods in Kyrgyz and Ukrainian universities will help to understand how to integrate technology into the educational process. In particular, Kyrgyzstan, as a country in transition, has unique challenges and opportunities in the field of education. The development of IT infrastructure at universities can be a key factor in increasing the competitiveness of graduates in the international labour market.

The relevance of the topic lies in the fact that the modern world is changing rapidly thanks to the latest technologies. In order for students to be prepared to work in modern conditions, universities must use innovative teaching methods. The use of modern IT in the educational process helps to make learning more effective, interesting and accessible. It also allows students to acquire the necessary skills for a successful career. Research helps to understand which technologies and methods are most effective in improving the quality of education. It also allows universities to compete internationally by attracting talented students and faculty from around the world. Researching the effectiveness of these methods helps to find the best practices and implement them in the educational process, ensuring high quality education and training of qualified specialists for the labour market.

Many contextual and cultural elements may have an impact on the adoption and efficacy of IT in education. The Kyrgyzstan's educational institutions confront obstacles such as inadequate finance, outdated infrastructure, and a lack of widespread internet access, especially in remote regions, as the integration of IT in education in the country continues to develop. Despite the considerable efforts being made by universities, these factors contribute to the slower adoption rate of contemporary IT solutions. In contrast, Ukraine's institutions have a more advanced IT infrastructure, and the government supports digital education programs with greater financing. In Ukrainian institutions, the use of online resources, distant learning, and interactive learning platforms is becoming common, enabling increased accessibility and learning flexibility. However, there are issues that both countries face, like the competition for international financing to promote technology improvements and the requirement for professional development for educators to deploy IT efficiently (Hlazunova et al., 2023; Abdaoui et al., 2024; Sulthon et al., 2024; Wirnayanti et al., 2024). The significance of focused approaches to solve these issues in Kyrgyzstan and Ukraine is highlighted by these contextual differences which show how cultural, economic, and infrastructure factors can influence the adoption and efficacy of IT in education.

The successful integration of digital tools in education depends on providing teachers with adequate training in the usage of contemporary IT (Sakhipov et al., 2023; Halimah et al., 2024; Melinda et al., 2024; Muis et al., 2024). Offering ongoing professional development programs that emphasise practical instruction using the newest IT tools and teaching techniques is one important tactic (Kulyk, 2023; Islaihah, 2024; Rachmanto, & Akande, 2024; Simamora et al., 2024). In order to enable teachers to experiment with and integrate digital platforms, learning management systems, and interactive tools in their classrooms, these programs ought to provide hands-on experience. Promoting collaborative learning among educators, where they may exchange tactics, experiences, and difficulties pertaining to the use of IT in the classroom, is another great strategy (Fazan et al., 2023; Puspitasari, 2024; Somantri, 2024; Sunia, 2024). The adoption of new technology can be greatly aided by peer-to-peer support networks. Educational systems can enable teachers to successfully incorporate IT into their instruction by putting these strategies into practice, which will improve student learning results and their own professional development (Nwune et al., 2023; Altynbekova et al., 2024; Binti M, & Adeshina, 2024; Habiburrohman et al., 2024).

Previous studies of innovative teaching methods using modern IT have been conducted by many scholars, and each of them has made a certain contribution to this area. In particular, Dou and Yang (2024) analysed the impact of digital platforms on the learning achievements of higher education students. They noted that the use of interactive platforms significantly improves learning and student engagement. Researchers Deisenhofer et al. (2022) focused on the use of video conferencing in the educational process. Their study showed that video conferencing promotes greater interactivity and student engagement, especially in distance learning. And mobile learning, in particular, the use of

relevant applications in the educational process, contributes to greater flexibility and accessibility, which is especially relevant for students with limited access to traditional resources.

The impact of gamification on learning was studied by Usman et al. (2024). They found that the integration of game elements into the learning process can increase student motivation and improve their results. This idea was also supported by Sagatbek et al. (2024), who focused their research on the impact of virtual reality (VR) and augmented reality (AR) in education. They noted that these technologies can significantly improve the visualization of complex concepts and make learning more engaging. He (2020) explored the role of social media in education and found that there are platforms that can also be effective tools for discussing learning materials and supporting communication between students and teachers. Liu (2024) focused his research on the analysis of big data in the educational process. He noted that the use of analytical tools can help teachers better understand the needs and progress of students, as well as adapt learning materials to meet their needs.

The significance of online courses (MOOCs) and their impact on the accessibility of education was identified by Ji (2023), who noted that they can significantly increase access to quality education for students from different parts of the world. The results of this study showed that MOOCs provide the opportunity to study at a time convenient for the student, which is especially important for those who work or have other commitments. They also allow each student to choose a wide range of subjects and topics that meet their needs and interests, which increases motivation to learn and enables them to gain knowledge in different fields. The study confirms that such courses are an effective means of increasing the accessibility of quality education to a wide audience.

Xu (2024) studied the effectiveness of e-textbooks. His research has shown that e-textbooks can be more convenient and cost-effective, as well as contribute to the interactivity of the learning process. Kasimakhunova and Atajonova (2024) focused on the impact of adaptive learning. They noted that adaptive learning systems that use artificial intelligence (AI) to adapt learning materials to the individual needs of students can significantly improve learning efficiency. The researchers' work demonstrates that the integration of technology can significantly improve the accessibility, flexibility, and effectiveness of learning, but the issue is not sufficiently studied in Kyrgyzstan's universities.

The purpose of this study was to assess the effectiveness of innovative teaching methods using modern IT in terms of improving learning outcomes, student engagement and overall quality of education. The objectives of the study were: 1) Analysing the effectiveness of various innovative teaching methods; 2) Determining the level of student involvement in the educational process in the selected universities of Kyrgyzstan and Ukraine; 3) Developing recommendations for the introduction of innovative teaching methods in the educational process of higher education institutions.

RESEARCH METHOD

The study was conducted in two stages. The first stage included a SWOT analysis of four universities. The Kyrgyz National University named after Jusup Balasagyn is the oldest and largest university in the country, recognized for its academic reputation. The American University of Central Asia is known for its high Western standards of education and international recognition. Kyrgyz State Technical University named after I. Razzakov specializes in technical and engineering sciences, being a key technical institution. Ala-Too International University demonstrates an innovative approach and active development of modern educational programmes. These universities were selected based on various criteria that provide a comprehensive analysis and comparison. This selection allowed for a comprehensive analysis of the state and prospects of implementing IT in various types of educational institutions in Kyrgyzstan, taking into account both national and international aspects. This refers to factors that involve both domestic issues specific to a particular country (in this case, Kyrgyzstan) and global considerations that involve multiple countries or international organizations.

The SWOT analysis was chosen as the main tool because of its ability to assess in detail the internal and external factors that influence the use of IT in teaching. In particular, the curricula and programmes on the official websites of the institutions were analysed to understand how IT is integrated into the educational process. The tools and methods used during lectures, seminars, and workshops were studied. Each of the selected universities was assessed according to the following parameters: availability and quality of digital learning platforms, use of IT in teaching, professional development of teachers in the field of IT, level of technical support, and feedback from students. Strengths were defined, such as advanced digital platforms, a high level of technical support, as well as weaknesses, such as insufficient IT training for teachers and a low level of interactivity of online courses. It also

identified opportunities, such as the growing demand for distance learning, and threats, such as technical issues and limited internet access for some students.

However, certain limitations of the SWOT approach should be considered. One key limitation is its subjective nature, as it relies on the perspectives and interpretations of those conducting the analysis. This may introduce bias or lead to incomplete assessments. The accuracy and thoroughness of the data gathered are critical to the quality of the results, and a lack of thorough data might lead to a distorted or simplistic view of the circumstances. SWOT analysis also frequently concentrates on static issues, which may limit the conclusions' long-term relevance. Additionally, it only identifies areas of concern and does not automatically offer solutions or strategies for resolving difficulties that have been found. Finally, a fragmented view of complex topics may result from the approach's failure to completely reflect interdependencies across factors.

The second stage included a comparative analysis of the results of the SWOT analysis of all four universities with higher education institutions in Ukraine, in particular with Taras Shevchenko National University of Kyiv, Ivan Franko National University of Lviv and Luhansk Taras Shevchenko National University. A comparison of higher education institutions in Ukraine and Kyrgyzstan was important for determining the level of development of education in Kyrgyzstan and identifying opportunities for improvement. This allowed us to identify general trends and specific challenges for each type of university. Based on the two-stage study, recommendations were developed for each type of university, taking into account the results of the analysis. The SWOT analysis and comparative analysis of the four universities allowed us to comprehensively assess the state and prospects of innovative teaching methods using modern IT, as well as to develop practical recommendations for their further development.

RESULTS AND DISCUSSION

IT has become an integral part of the modern world, and its impact on society is hard to overestimate. It is a broad term that covers all aspects of creating, storing, transmitting and processing information using computer systems, software, and networks. The concept of IT includes many disciplines, from computer engineering to programming, from networking to cybersecurity. IT encompasses modern computers, servers, and other computing devices capable of processing huge amounts of data at extremely high speeds. It also includes information storage. Modern data storage systems, such as cloud storage, allow storing and accessing huge amounts of information from anywhere in the world. The main types of IT include the following categories, as shown in Figure 1.

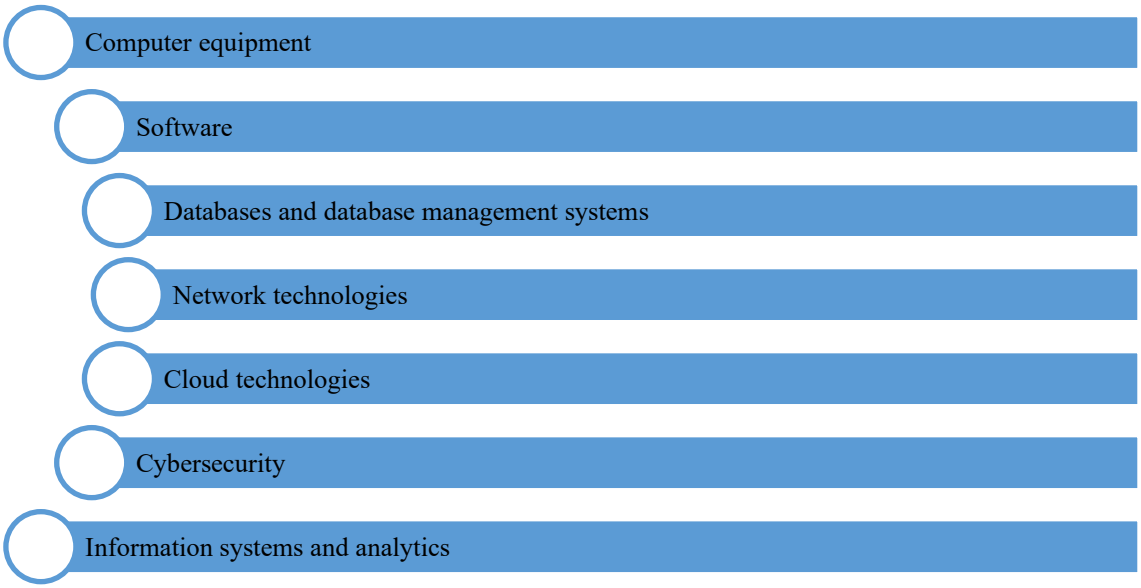

Figure 1. Types of IT

Computer hardware is the hardware used to process information. This includes personal computers, servers, mobile devices, and specialized computing devices such as supercomputers. There are also applications and operating systems that control the operation of the hardware and ensure that specific tasks are performed (Vidergor, 2022). These can include basic operating systems (Windows,

macOS, Linux) and applications for word processing, spreadsheets, graphics, etc. Network technologies are innovations that enable data transfer between different computing devices and include local area networks (LAN), wide area networks (WAN), wireless networks (Wi-Fi), and the Internet. Databases and database management systems are also technologies that organize, store and manage large amounts of data. Modern database management systems, such as Oracle, MySQL, Microsoft SQL Server, allow for efficient storage and processing of various types of data.

Another type of IT is cloud computing, which allows data to be stored and processed on remote servers accessed via the Internet. This includes services such as Amazon Web Services, Microsoft Azure, and Google Cloud. Cybersecurity also includes technologies and methods of protecting information systems from unauthorized access, attacks, and damage. It includes both hardware and software security tools, as well as security policies and user training (Aryadi et al., 2022; Liu, 2022; Repriani et al., 2022; Nahar, 2023). The last major type is information systems and analytics, which provide data collection, processing, and analysis for management decision-making and include business intelligence (BI) systems, enterprise resource planning (ERP) systems, and customer relationship management (CRM) systems. The development of IT has had a significant impact on all areas of life. They provide quick access to information, automate business processes, improve communication and collaboration, and increase efficiency and productivity. In the education sector, IT facilitates the development of distance learning and access to knowledge. In medicine, it helps improve diagnosis and treatment of patients. The introduction of IT in production allows automating processes and improving product quality. Modern IT is developing at an extremely fast pace, integrating into all aspects of life: from AI and machine learning to the Internet of Things (IoT) and big data. Universities play a key role in this process, acting as centres of innovation, research and training for new professionals. In Kyrgyzstan, universities are actively involved in the development of IT into education, providing students with the necessary knowledge and skills to work in the modern world.

One of the main trends in IT development is the rapid spread of AI and machine learning. These technologies are used to automate various processes, analyse large amounts of data, and develop new products and services (Clark et al., 2023; Nada et al., 2023; Ulfa et al., 2023). Universities are incorporating courses in these disciplines into their curricula, giving students the opportunity to learn the latest methods and tools. In Kyrgyzstan, universities such as the Kyrgyz State Technical University named after I. Razzakov, offer specialized programmes covering these areas. IoT is also an important area of IT development. Connecting different devices to the Internet allows for real-time data collection and analysis, creating new opportunities for manufacturing process optimisation, energy efficiency, and quality of life enhancement. Big data and data analytics are also in the focus of modern IT (Porter et al., 2022). As the amount of information generated by society increases, there is a growing need for specialists who can effectively process and analyse this data. Universities in Kyrgyzstan, such as the Kyrgyz National University named after Jusup Balasagyn, offer study programmes that focus on data analytics, statistics and mathematical modelling, preparing students to work in this crucial field. In particular, cloud technologies have become an integral part of modern IT, providing convenient access to resources and services via the Internet. Students now have access to advanced computing tools and resources thanks to the use of cloud platforms for research and instruction. In Kyrgyzstan, the introduction of cloud technologies in the educational process can significantly improve the efficiency of teaching and research. Cybersecurity is also a key aspect of IT development. With the increasing number of cyber threats, the need for qualified cybersecurity professionals is becoming more and more urgent. Universities in Kyrgyzstan are including cybersecurity courses in their curricula, providing students with knowledge of how to protect information systems and fight cybercrime.

Kyrgyzstan’s universities actively cooperate with international organizations and universities from other countries, sharing experiences and knowledge. This contributes to the introduction of advanced technologies and teaching methods, ensuring high quality education and training. Thanks to such efforts, Kyrgyzstan's universities are becoming critical centres of IT development in the region, contributing to overall progress and innovation. The development of modern IT is closely linked to universities, which act as centres of knowledge, research, and innovation. In Kyrgyzstan, universities play a major role in this process by training a new generation of specialists who are able to effectively use modern technologies to solve various problems and improve the quality of life. For a more detailed analysis of the introduction of modern IT in Kyrgyz universities, it is advisable to conduct a SWOT analysis to identify the strengths, weaknesses, opportunities, and threats of this process (Table 1).

Table 1. SWOT analysis of the activities of the Kyrgyz National University named after Jusup Balasagyn

Strengths	Weaknesses
One of the oldest and most famous universities in Kyrgyzstan. Well-developed infrastructure, including modern IT laboratories. Highly qualified teaching staff, many of whom have international experience. Active cooperation with foreign universities and organizations.	Limited funding for the introduction of new technologies. Bureaucratic obstacles to innovation. Some IT equipment needs to be updated.
Opportunities	**Threats**
Opportunities to receive international grants for the development of IT infrastructure. Development of online courses and distance learning. Organizing trainings and seminars for teachers using modern IT.	Growing competition from other universities. The rapid development of IT can lead to a technological lag if a high level of innovation is not maintained. Economic instability can affect the funding of educational projects.

The SWOT analysis of the Kyrgyz National University named after Jusup Balasagyn revealed its key strengths, such as active international cooperation and the introduction of advanced technologies and teaching methods. Weaknesses include limited access to the Internet in some regions and insufficient funding. At the same time, the university has significant opportunities for further development through the integration of modern IT and support from international partners. Threats include rapid changes in the technological environment and competition with other educational institutions (Table 2).

Table 2. SWOT analysis of the American University of Central Asia

Strengths	Weaknesses
Strong emphasis on the American education system and international standards. Use of modern technologies and methods in the educational process. High level of English, which is an advantage for students wishing to study abroad.	High tuition fees can be unaffordable for many students. Lack of local staff, so dependence on foreign teachers. Partial lack of adaptation of training materials to local conditions.
Opportunities	**Threats**
Expanding international partnerships and exchange programmes. Involvement in international innovation projects and research. Introducing new programmes and courses, particularly in the IT sector.	Political instability can affect international funding and student exchanges. High costs can reduce access to education. Increased competition from other private and international universities.

In particular, the SWOT analysis of the American University of Central Asia has identified its key strengths, such as high-quality academic programmes, active international cooperation and the introduction of advanced educational technologies. Weaknesses include limited access to resources in some regions and dependence on external funding. It was important to conduct this analysis to identify opportunities, such as expanding partnership programmes and attracting innovation, as well as to identify threats, such as competitive pressure from other universities and rapid changes in the technological environment. This allows the university to strategically plan its development and increase its competitiveness in the international arena (Table 3).

Table 3. SWOT analysis of the Kyrgyz State Technical University named after I. Razzakov

Strengths	Weaknesses
Strong technical background and specialization in engineering disciplines. Extensive experience in training technical specialists. High demand for graduates in the labour market.	The need to update the technical base and equipment. Limited resources to implement new technologies. Insufficient motivation of teachers to implement innovative methods.
Opportunities	**Threats**
Industrial partnerships, i.e., cooperation with international technical development grants. Implementation of new technologies and methods in the educational process.	Lagging behind modern IT trends. Economic instability may affect the financing of technical projects. Growing competition from other technical universities and private educational institutions.

The SWOT analysis of the Kyrgyz State Technical University named after I. Razzakov has identified several key aspects that distinguish it from the Kyrgyz National University named after Jusup Balasagyn and the American University of Central Asia. The main strengths of Kyrgyz State Technical University include its technical focus and practical orientation. The university has a strong technical base and focuses on training specialists in technical sciences, which is crucial for the country's economic development. Much attention is paid to the practical skills of students, which ensures their competitiveness in the labour market.

Compared to the Kyrgyz National University named after Jusup Balasagyn and the American University of Central Asia, the Kyrgyz State Technical University named after I. Razzakov has its own unique strengths and challenges. Its technical focus and practical orientation are important strengths, but limited financial resources and outdated facilities are significant obstacles. Expanding international cooperation and attracting investment could be key to overcoming these challenges and ensuring the university's successful development in the future (Table 4).

Table 4. SWOT analysis of Ala-Too International University activities

Strengths	Weaknesses
Strong international orientation and cooperation with foreign universities. Use of modern teaching methods and technologies. Opportunities for students to participate in international exchange programmes.	Limited funding for the introduction of new technologies. Insufficient number of highly qualified teachers in the field of IT. High tuition fees compared to state universities.
Opportunities	**Threats**
Opportunity to attract international grants and funding. Expanding the number of courses and programmes in IT. Participation in international research and innovation projects and initiatives.	Economic instability affects the financial stability of the university. Competition from other international and private universities. The rapid pace of technological development can create risks of falling behind.

The SWOT analysis helped to assess the potential and challenges of each of the four universities in implementing innovative teaching methods using modern IT. The SWOT analysis of four universities in Kyrgyzstan – Kyrgyz National University named after Jusup Balasagyn, American University of Central Asia, Kyrgyz State Technical University named after I. Razzakov and Ala-Too International University – allows comparing their strengths and weaknesses, as well as the opportunities and threats they face. Kyrgyz National University named after Jusup Balasagyn is the oldest and largest university in Kyrgyzstan, which gives it a significant advantage in terms of historical context and public trust. Its strengths include a wide variety of faculties and programmes, a highly qualified faculty and a strong research base. However, like many other public universities in the region, it faces funding challenges and the need to modernize its teaching facilities and equipment. Opportunities include expanding international cooperation and introducing modern technologies into the educational process.

Threats are related to competition from private and international universities that attract students through better learning conditions and modern programmes.

The American University of Central Asia stands out among other universities for its international accreditation and educational standards. The main strengths of the university are its high-quality education, modern curricula integrated with Western standards, and a strong international community. However, high tuition fees can be a barrier for many local students. Opportunities include further expanding exchange programmes and attracting international grants. The main threats are economic instability in the region, which may affect funding and access to education. Kyrgyz State Technical University named after I. Razzakov specializes in technical and engineering sciences, making it a key institution for training specialists in these fields. Strengths include a focus on technical disciplines, the availability of laboratories and research centres, and close ties with industry. Key weaknesses include limited funding for research and the need to upgrade facilities. Opportunities for the university lie in developing cooperation with other international technical higher education institutions and companies to implement joint projects. Threats may arise from competition from other technical universities and institutions offering innovative programmes and research opportunities.

Ala-Too International University is one of the youngest universities on this list, which gives it a dynamic and innovative approach to education. The university's strengths include its modern curricula, emphasis on international cooperation and multicultural environment. Weaknesses include limited resources and the need to strengthen the research base. Opportunities for Ala-Too International University include the development of new specialities, attracting foreign teachers and students, and participation in international educational programmes. Threats to the university may include economic difficulties and high competition in the market of educational services. Each of the reviewed universities has its own unique strengths and weaknesses, as well as opportunities and threats, depending on their specifics and external environment. The Kyrgyz National University named after Jusup Balasagyn benefits from its history and scale, but needs to be modernized. The American University of Central Asia has a high quality of education and international recognition, but faces financial challenges for students. Kyrgyz State Technical University named after I. Razzakov has strong potential in technical sciences, but needs to upgrade resources. Ala-Too International University demonstrates an innovative approach but has limited resources for development.

The level of student involvement in the learning process in the reviewed universities of Kyrgyzstan varies considerably depending on the specifics of each institution (funding, technological infrastructure, teaching methods, curriculum). Kyrgyz National University named after Jusup Balasagyn offers a wide range of academic and extracurricular opportunities, but faces challenges in modernizing its teaching methods. The American University of Central Asia demonstrates a high level of engagement due to its individual approach and modern technology, which ensures high student motivation. Kyrgyz State Technical University named after I. Razzakov, actively engages students through practical classes and cooperation with industry, although limited resources can be an obstacle. Ala-Too International University is committed to innovation and supporting student initiatives, but needs to improve its facilities.

Innovative technologies play a key role in engaging students in the learning process, increasing their motivation and improving the quality of education. It is worth looking at the specific steps taken by four leading universities in Kyrgyzstan – Kyrgyz National University named after Jusup Balasagyn, American University of Central Asia, Kyrgyz State Technical University named after I. Razzakov and Ala-Too International University – to introduce innovative technologies into the educational process. Kyrgyz National University named after Jusup Balasagyn is actively implementing innovative technologies to improve the learning process. One of the main steps is the creation of an electronic platform for distance learning, which allows students to access learning materials, submit assignments and communicate with teachers online. In addition, the university is investing in equipping classrooms with multimedia equipment such as interactive whiteboards and projectors, which allows teachers to deliver classes using visual and interactive methods. The university is also developing its scientific laboratories, introducing modern technologies for research and practical training.

The American University of Central Asia is known for its integrated approach to using innovative technologies in education. One of the key steps is the use of the Moodle platform, which allows creating interactive courses with gamification elements, video lectures and tests. This university also actively uses VR and AR technologies for laboratory classes and simulations. For example, medical students can use VR glasses to study human anatomy, and architecture students can create

virtual models of buildings. The university also supports student start-ups and innovative projects by providing access to laboratories and incubators.

Kyrgyz State Technical University named after I. Razzakov is focused on introducing technical innovations into the educational process. The university actively uses computer-aided design systems and other specialized software products to teach engineering students. In addition, the above-mentioned institution creates modern robotics laboratories where students can develop and test their projects using the latest equipment. The university has also introduced the Smart Campus programme, which includes the automation of many administrative processes, allowing students to spend more time on their studies and research. Ala-Too International University is also taking significant steps to introduce innovative technologies into the educational process. The university uses the Blackboard platform for course management, which allows teachers to create interactive courses using video, audio, and other multimedia materials. In addition, Ala-Too International University is actively developing online education, offering students access to international courses and programmes. The university is also implementing AI technologies to analyse educational data and adapt curricula to the needs of students. For example, AI can analyse student performance and provide recommendations on how to improve their results.

Assessment of using modern IT in Ukraine in comparison with Kyrgyzstan is important for understanding the level of implementation of the latest technologies in the educational process. This also helps to identify areas for further development of the educational system in both countries. The activities of Taras Shevchenko National University of Kyiv have their own peculiarities, which are presented in Table 5.

Table 5. SWOT analysis of Taras Shevchenko National University of Kyiv

Strengths	Weaknesses
High level of academic reputation and long history. Well-developed infrastructure with modern IT laboratories and equipment. Highly qualified teachers with extensive experience and international connections. A wide network of partnerships with leading universities around the world.	Limited funding to implement new technologies and upgrade equipment. Complex administrative procedures can slow down the introduction of innovations. The need to increase the motivation of teachers to implement new technologies.
Opportunities	**Threats**
Opportunity to receive international grants and funding to develop innovative teaching methods. Expanding distance learning and online courses. Conducting seminars and trainings for teachers using modern technologies.	Constantly growing competition from other universities in Ukraine and abroad. The rapid development of technology can lead to a technological lag without proper updating. The impact of economic difficulties on the financing of educational projects.

At the same time, the SWOT analysis of Ivan Franko National University of Lviv identified essential aspects of the introduction of It into teaching methods, which allows developing strategies for the further development of educational systems of Kyrgyz universities (Table 6).

Table 6. SWOT analysis of Ivan Franko National University of Lviv

Strengths	Weaknesses
Rich academic traditions and a high level of education. Active participation in international projects and exchange programmes. Strategic location in the cultural centre of Ukraine. Highly qualified teaching staff.	The need to upgrade infrastructure and IT equipment. Insufficient funding to implement innovative projects. Relatively slow adaptation to new technologies and teaching methods.
Opportunities	**Threats**
Expanding cooperation with foreign higher education and research institutions. Raising additional funds through international grants and funds.	Growing competition from other universities. Volatile economic conditions may affect funding. The high pace of technological change can create challenges for keeping curricula relevant.

Compared to Taras Shevchenko National University of Kyiv and Ivan Franko National University of Lviv, Luhansk Taras Shevchenko National University has its own peculiarities and challenges. The socio-political situation in Ukraine has had a significant impact on the development of this institution. Remaining committed to Ukraine, the university's faculty and students have repeatedly found themselves evacuated — this is the fourth time in the history of the institution. From the beginning of the Russian aggression, in the period from 2014 to 2022, the university was evacuated and continued to operate in several cities in Luhansk region: Starobilsk, Kreminna, Rubizhne, Lysychansk, and Shchastia. After the start of Russia's full-scale invasion in 2022, the university moved to Poltava, where it continues its educational activities using a combination of traditional classroom and distance learning. One of its advantages is its technical orientation and practical approach, which significantly improve the quality of education. The university's teachers are involved in international projects such as the Erasmus+KA2 CBHE MoPED — Modernization of Pedagogical Education, as well as other initiatives, such as G-202301-69859 and G-202301-69860, aimed at introducing new courses in cyber hygiene and cybersecurity. The university also participates in the project No. 4019-08 under the agreement ENI/2018/398-605, which aims to restore and strengthen peace in eastern Ukraine. International cooperation and investment are key to the development of the university and the introduction of modern teaching methods (Table 7).

Table 7. SWOT analysis of Luhansk Taras Shevchenko National University

Strengths	Weaknesses
Active international orientation and partnerships with foreign universities. Application of modern pedagogical methods and technologies. Opportunities for students to participate in international exchange programmes.	Limited financial resources to integrate new technologies and upgrade equipment. Complicated administrative procedures slow down the process of introducing innovations. Insufficient motivation of teachers to use new technologies.
Opportunities	**Threats**
Obtaining international grants and funding. Increase the number of courses and programmes in the IT sector. Organizing seminars and trainings for teachers using advanced technologies. Participation in international research and innovation projects and initiatives.	Socio-political and economic instability affects the financial stability of the university. Rapid technological development can lead to a technological lag if there are no timely updates. Competition from other universities.

In Ukraine, the introduction of innovative teaching methods with the help of modern IT has been actively developing in recent years. The government and the private sector have invested significant resources in the digitalization of education, including the introduction of e-textbooks, online learning platforms, distance learning and the use of interactive technologies in classrooms (Vovchasta et al., 2024). The COVID-19 pandemic and the difficult socio-political processes in Ukraine have significantly accelerated the introduction of distance learning. Many schools and universities have

switched to online learning, using platforms such as Zoom, Google Classroom and Microsoft Teams (Ponomarenko et al., 2021). The introduction of electronic textbooks and learning materials has become the norm in many educational institutions. This allows pupils and students to access learning resources from anywhere and at any time. The use of interactive whiteboards, multimedia projectors and other tools can make the learning process more interesting and effective (Rzhevska et al., 2023). Numerous Ukrainian universities and private companies offer online courses, allowing students to expand their knowledge and skills at their own convenience. The introduction of modern IT into the education system in Ukraine is more advanced than in Kyrgyzstan, due to better technical infrastructure, greater financial resources and more active government support. Distance learning technologies and electronic textbooks are more widely used in Ukraine, which can significantly improve the accessibility and quality of education.

In Kyrgyzstan, the introduction of IT in the educational process faces a number of challenges, but the government and educational institutions are making significant efforts to overcome these problems. Improving access to the Internet and teacher training are key areas that need further development (Balykbayev et al., 2022). Thus, it is important for both countries to continue investing in the development of digital technologies in education, to improve the skills of teaching staff, and to ensure that all pupils and students have access to quality education. In general, all four universities in Kyrgyzstan are trying implementing innovative technologies to increase the level of student engagement in the learning process. Kyrgyz National University named after Jusup Balasagyn focuses on creating electronic platforms and equipping classrooms with multimedia equipment. The American University of Central Asia uses interactive platforms, VR and AR to conduct classes and support student start-ups. Kyrgyz State Technical University named after I. Razzakov implements specialized software and creates modern robotics laboratories. Ala-Too International University uses the Blackboard platform, AI to analyse learning data, and develops online education. Each of these universities makes its unique contribution to the development of education and student motivation, which contributes to the overall progress of the Kyrgyz educational system.

The introduction of innovative teaching methods in the educational process of higher education institutions is a crucial step towards improving the quality of education and student motivation. Modern technologies and approaches allow for a dynamic and interactive environment that promotes a deeper understanding of the material and the development of critical thinking (Soboleva et al., 2020). Here are some recommendations for implementing innovative teaching methods in higher education institutions. Firstly, it is important to introduce blended learning, which combines traditional teaching methods with the use of digital technologies. This can include online courses, video lectures, interactive exercises and testing, allowing students to learn at their own pace and time (Zitha et al., 2023). This approach not only increases the flexibility of the learning process, but also contributes to more effective learning. Instructors should actively use distance learning platforms, such as Moodle or Blackboard, to organize and manage courses.

Digital literacy is an essential skill that enables both students and teachers to navigate and make the most of digital tools and resources (Ponomarenko, 2022). It includes the capacity to assess online content critically, communicate and collaborate via technology, and use digital tools for creativity and problem-solving. It is advised that educational systems put in place focused training programs for teachers and students that emphasise practical skills and responsible technology use (Lukyanenko et al., 2023). Instructors should have access to ongoing professional development opportunities to stay up to date with changing pedagogical approaches and technological advancements. For students, incorporating digital literacy as part of the core curriculum ensures that they develop these skills from an early age. Additionally, creating a supportive environment where both parties can explore new technologies and share best practices will foster a culture of digital innovation (Hlazunova et al., 2023). Encouraging collaboration between schools, technology companies, and other stakeholders can also provide access to valuable resources and tools to further improve digital literacy across educational settings.

An essential aspect is the use of active learning methods. This includes group projects, discussions, case studies and role-playing games that promote teamwork, critical thinking and creativity. Teachers can organize small group work where students have the opportunity to discuss and solve real-life problems, which contributes to a better understanding of theoretical concepts and their application in practice (Guliyeva & Azizova, 2022; Mialkovska et al., 2024). This approach allows students to actively participate in the learning process, increasing their motivation and engagement. The

use of VR and AR allows for the creation of simulated environments where students can practice in conditions close to the real world. For example, medical students can use VR to study anatomy and surgical procedures, and architecture students can use it to design and virtually inspect buildings (Onello, 2023). This not only makes learning more interesting, but also allows students to acquire the practical skills necessary for their future profession. In addition, adaptive learning should be implemented using AI technologies to analyse student performance and adapt learning materials to their individual needs.

Adaptive learning is an educational approach where the content, pace, and learning strategies are tailored to meet the individual needs of students, often using data and algorithms to adjust to each learner's progress and performance. In connection with AI, adaptive learning systems leverage AI algorithms to analyze student behavior and performance in real-time, providing personalized feedback, adjusting difficulty levels, and suggesting resources to enhance learning outcomes (Storey & Ibrahim, 2025). This allows teachers to provide personalized advice and support to students, which helps to increase learning efficiency. Adaptive systems can automatically adjust the complexity of tasks, and provide additional resources and feedback based on individual student achievements. It is important to create conditions where students can implement their ideas and projects, while receiving the necessary support from teachers and mentors. These can be incubators and accelerators at universities where students can work on their start-ups, participate in competitions and receive funding to develop their projects. This approach promotes the development of entrepreneurial thinking and the innovative potential of students.

In particular, open educational resources allow students to access learning materials from all over the world, which helps to expand their knowledge and skills (Li et al., 2024). Teachers can use Open Educational Resources to create their own courses and materials, which can significantly reduce tuition costs and increase access to quality education. It is also relevant to teach students how to effectively use these resources for self-study and research. Gamification involves the use of game elements, such as points, levels, rewards, and competitions, to increase student motivation and engagement. Instructors can create interactive assignments, quizzes, and contests that make learning more interesting and engaging. Gamification also promotes healthy competition and teamwork among students. As technology evolves, educational systems must anticipate future trends in technology and pedagogy. For example, while VR/AR may revolutionise immersive learning environments in domains like engineering and medical, AI and machine learning may allow for personalised learning experiences (Hennig et al., 2024). In order to stay ahead of the curve, educational institutions should make continuous investments in training teachers on new technologies and cultivate collaborations with legislators and tech developers to produce flexible curricula. Digital literacy, critical thinking, and problem-solving abilities must be prioritised in order to prepare pupils for a future influenced by digital innovation.

IT can be easily incorporated into a variety of fields, such as the social sciences, natural sciences, and humanities, to improve teaching and learning. Students can interact creatively with primary materials in the humanities by using digital tools for historical text analysis, multimedia presentation creation, and collaborative study via online platforms. IT supports a more data-driven approach to research in the social sciences by facilitating data analysis through statistical tools and enabling the use of digital surveys and databases for collecting and analysing big datasets (Irwandi et al., 2024). IT is essential for simulations, data visualisation, and virtual experiments in the natural sciences because they give students the chance to learn by doing without being limited by real lab space. IT integration in many fields promotes critical thinking, active learning, and increased student involvement. Additionally, it equips students for a technologically advanced world where proficiency with digital tools is becoming more and more necessary for success in the classroom and in the workplace. Integrating IT into the curriculum allow teachers for providing a more dynamic and engaging learning environment by.

The introduction of innovative teaching methods into the educational process of higher education institutions is a critical step towards improving the quality of education and developing modern skills in students (Cherepovska et al., 2021). The use of blended learning, active learning methods, VR and AR technologies, adaptive learning, support for student start-ups, open educational resources, and gamification allows for a dynamic and interactive learning environment. This also promotes a deeper understanding of the material and the development of critical thinking. Universities

that actively implement these methods can significantly increase the motivation and performance of their students, preparing them for the challenges of the modern world.

The results obtained have shown that in a world where digital technologies are rapidly developing, the integration of these tools into the learning process is becoming essential to ensure high quality education. It was found that one of the key aspects of using modern IT in education is the use of interactive platforms such as Moodle, Google Classroom and Edmodo. This study has shown that the use of these platforms significantly improves student engagement and simplifies access to learning materials. The study by Han and Zhao (2024) confirmed these findings. They note that interactive platforms promote greater student engagement in the learning process and facilitate communication between teachers and students. In particular, Dallaqua et al. (2024) emphasized that the use of Moodle allows students to receive quick feedback from teachers, which helps to increase motivation to learn. The study by Hamidov and Akhadova (2024) also confirm the effectiveness of interactive platforms. They found that students who actively use Google Classroom demonstrate higher academic results compared to those who use traditional teaching methods. The present study showed similar results, with higher education students who use interactive platforms having higher grades and better academic performance.

Another important aspect is the use of VR and AR technologies in education. This study has shown that the use of VR and AR technologies contributes to a deeper understanding of complex concepts and increases students' interest in learning. The study by Abduvalieva et al. (2024) confirmed these findings. They note that the use of interactive methods in teaching allows for the creation of interactive simulations that help students learn better. At the same time, Vasquez-Pajuelo et al. (2024) noted that VR technologies are particularly effective in the study of natural sciences, where students can virtually experiment with various chemical reactions and physical phenomena. The results of the study showed that the use of mobile applications for learning contributes to increasing the accessibility of education and student engagement. This coincides with the findings of Batanassova and Assylbekova (2024). The researchers note that mobile learning allows students to access learning materials anytime and anywhere, which increases their motivation to learn. The researchers emphasized that mobile applications are particularly effective for self-paced learning, where students can study material at their own pace. The study by Gurnani and Kaur (2024) also confirmed the effectiveness of mobile learning. They found that students who use mobile apps to learn foreign languages perform better on tests than those who use traditional methods.

The results obtained on adaptive learning, which is an innovative approach and the use of algorithms to adapt learning materials to the individual needs of students, were confirmed in the work of Zheng and Wang (2024). Borzenko et al. (2024) has shown that the use of adaptive learning systems helps to improve learning efficiency and reduce the number of academic deficits. The study by Allayarova (2019) coincides with these findings. They note that adaptive learning systems allow students to learn material at their own pace, which contributes to a deeper understanding and assimilation of knowledge. Blended learning, which combines traditional methods with the use of IT, is another effective approach. This study showed that blended learning increases student motivation and improves academic performance. The findings of Triyanto et al. (2024) confirm these thoughts. They noted that blended learning allows combining the advantages of traditional methods with the interactivity and accessibility of IT. Amirseit et al. (2024) found that blended learning is particularly effective for learning complex topics, where students can receive support from teachers and use digital tools to gain a deeper understanding of the material. A study by Cheng (2020) also confirmed the effectiveness of blended learning. They found that students who participate in blended learning perform better on tests and have a better understanding of the material compared to those who use only traditional or digital methods.

The results of the study showed that to overcome the above challenges, it is necessary to ensure equal access to IT resources for all students, regardless of their socio-economic status. This could include providing computers and Internet access in schools and universities, as well as developing financial support programmes for students from low-income families. Teachers should be provided with opportunities for professional training and courses to master modern technologies. These results are consistent with the findings of Lv (2022), Liu and Liu (2020), who studied the impact of digital technologies on the educational process in South Korea. They found that the use of IT in education contributes to increased academic performance and student engagement. They pointed out that digital technologies allow students to access learning materials anytime and from anywhere, which contributes

to more flexible and effective learning. The study by Akalanka and Manathunga (2022) also confirmed the effectiveness of IT in education. They studied the impact of digital technologies on the learning process in different countries and found that students using digital tools perform better in tests and have better academic performance compared to those using traditional teaching methods. This study has shown that the use of modern IT in education contributes to improving academic performance, student engagement and satisfaction with learning. The use of interactive platforms, VR and AR technologies, mobile and adaptive learning, and blended learning are effective methods of improving the quality of education.

CONCLUSION

The results obtained show the effectiveness of innovative teaching methods using modern IT in four leading universities of Kyrgyzstan. The study examined the concept of "information technology", its characteristics and main types, which allowed to identify key aspects of its use in the educational process. The main results of the study were based on a SWOT analysis of each of the universities, which allowed us to identify their strengths and weaknesses, opportunities and threats related to the introduction of modern IT. This analysis provided a comprehensive understanding of the effectiveness of various technologies and methods for improving the quality of education. A comparative analysis of four universities showed general trends and specific challenges for each type of institution. For example, the Kyrgyz National University named after Jusup Balasagyn has a strong reputation and developed infrastructure, but faces the challenges of limited funding and outdated equipment. The American University of Central Asia, with its international approach and high level of English, has strengths in the use of modern technology, but faces challenges of high tuition fees and a lack of local staff. Kyrgyz State Technical University named after I. Razzakov stands out for its technical facilities and demand for graduates, but needs to upgrade its technical facilities and motivate teachers to innovate. Ala-Too International University, with its internationalization and academic mobility, faces the challenges of limited resources and high tuition fees.

In Ukrainian universities, the introduction of innovative teaching through modern IT is taking place through the implementation of online platforms. Many universities use distance learning platforms such as Moodle, Google Classroom, and Microsoft Teams, which allows for access to learning materials and interactive interaction between teachers and students. University libraries and information centres are constantly updated with e-books, journals and databases, which helps to improve access to up-to-date scientific information. In addition, mobile applications are being developed to manage the educational process, allowing students to receive class schedules, exam results and other important messages directly to their smartphones. Such measures help to improve the quality of education, make the learning process more flexible and accessible, and prepare students for the challenges of the modern labour market.

Based on the analysis, recommendations were developed to improve the use of modern IT in teaching. In particular, these include the professional development of teachers, attracting additional resources to upgrade the technical base, and developing international partnerships to receive grants and finance innovative projects. To further develop this area, it is necessary to ensure equal access to IT resources for all students, regardless of their socio-economic status. Teachers should be given the opportunity to take professional training and courses to master modern technologies. Limitations of the study include the sample of four major universities in Kyrgyzstan and Ukraine, which may not fully reflect the assessment of the effectiveness of innovative teaching methods using modern IT in these countries. Prospects for further research include a deeper study of the impact of various digital technologies on the learning process and the development of new, more effective methods of integrating IT into teaching.

ACKNOWLEDGMENTS

None.

AUTHOR CONTRIBUTIONS

Conceptualization, Anastasiya Spaska and Yuliya Koval; Methodology, Halyna Kozub; Software, Vladyslav Kozub; Validation, Gulaim Abylasynova and Yuliya Koval; Formal Analysis, Vladyslav Kozub; Investigation, Yuliya Koval; Resources, Yuliya Koval; Writing – Original Draft Preparation, Anastasiya Spaska, Halyna Kozub, Gulaim Abylasynova, Vladyslav Kozub and Yuliya

Koval; Writing – Review & Editing, Anastasiya Spaska, Halyna Kozub, Gulaim Abylasynova, Vladyslav Kozub; Visualization, Yuliya Koval; Supervision, Anastasiya Spaska; Project Administration, Anastasiya Spaska; Funding Acquisition, Gulaim Abylasynova

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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