

THE IMPORTANCE OF MULTIMEDIA MEANS USAGE IN IMPROVING THE QUALITY OF EDUCATION

A IMPORTÂNCIA DO USO DOS MEIOS MULTIMÍDIA NA MELHORIA DA QUALIDADE DA EDUCAÇÃO

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Abstract. Integrating innovative technologies into the educational process can significantly enhance both students' understanding of the subject matter and improve the quality of education. The article deals with the issue of multimedia technology implementation with the aim of education quality improvement. The paper aims to research the most effective multimedia means in Ukrainian education establishments. To achieve the aim of the research, a set of methods was used: theoretical: analysis of scientific psychological and pedagogical sources; empirical: questionnaires, interviews; graphics. The research results have found that students get an opportunity to solve several academic problems in the process of multimedia tools using. It has been revealed that the most used multimedia technologies in Ukrainian education institutions are digital presentations, video and audio materials, e-learning platforms, webinars and video conferences. The research results made it possible to outline the key factors affecting the quality of education in Ukraine and the main reasons for the usage of multimedia to improve educational quality.

Keywords: quality of education, multimedia means, education process.

Resumo. A integração de tecnologias inovadoras no processo educacional pode melhorar significativamente a compreensão dos alunos sobre o assunto e melhorar a qualidade da educação. O artigo trata da questão da implementação da tecnologia multimídia com o objetivo de melhorar a qualidade da educação. O artigo tem como objetivo pesquisar os meios multimídia mais eficazes nos estabelecimentos de ensino ucranianos. Para atingir o objetivo da pesquisa, utilizou-se um conjunto de métodos: teóricos: análise de fontes científicas psicológicas e pedagógicas; empírico: questionários, entrevistas; gráficos. Os resultados da pesquisa constataram que os alunos têm a oportunidade de resolver diversos problemas acadêmicos no processo de utilização de ferramentas multimídia. Foi revelado que as tecnologias multimídia mais utilizadas nas instituições de ensino ucranianas são apresentações digitais, materiais de vídeo e áudio, plataformas de e-learning, webinars e videoconferências. Os resultados da investigação permitiram delinear os principais fatores que afetam a qualidade da educação na Ucrânia e as principais razões para a utilização de multimídia para melhorar a qualidade educativa.

Palavras-chave: qualidade da educação, meios multimídias, processo educativo.

INTRODUCTION

European integration supporting to development of common values is important for the promotion of a cohesive European society driving sustainable growth. We should improve the EU achievement rate for future generations (UNESCO Strategy). Such changes are possible with highly competent teachers and a productive education policy. Improving students' learning results, and giving them the necessary information and quality teaching to succeed requires efficient and maintained investment in education (PISA 2018, OECD).

Nowadays, there is a great number of educational challenges in Ukraine. We continue to develop new modern conceptual foundations of the national education system despite military operations in the country. Ukrainian integration into the European educational space takes place regardless of the difficult modern circumstances of danger to the population of our state.



The need to renovate the education of Ukraine is stipulated to its insufficient compliance with the modern demands of society. The modernization of an intended specialist training process involves increasing the requirements for their professional level. To reform the educational sector, it is necessary to increase the quality of education to act productively and purposefully in modern conditions. Considering this, the issue of implementing multimedia technologies while studying at educational institutions is relevant.

Most of the educational institutions in Ukraine today conduct educational processes in a mixed or distance format. The COVID-19 pandemic caused the largest disruption to education in history. Most education systems were unprepared, leaving one-third of learners without access to any remote learning and highlighting the urgency of equipping teachers with the requisite digital and multimedia means.

LITERATURE REVIEW

The paper joins a growing body of literature that employs both theoretical and practical frameworks on the issue of quality of education: studying international experiences of improving the quality of education through school-based management (De Grauwe, 2005); the influence of Graduates' competence and quality of education on employability among graduates (Ashenafi, 2019); an advanced technique as a means of online classroom visual tracking and quality evaluation (Nie and Zhe, 2020); better working conditions of educational institutes using improving quality education (Teguh and Bulent, 2020).

Scientific and methodological literature contains a certain amount of research on multimedia technology implementation into the modern educational process. Among them the main ones are: outlining cognitive theory of multimedia learning through 3D animation (Bhatti et al., 2017); the effect of interactive multimedia in E-learning technologies (Khamparia and Pandey, 2017); the importance of multimedia usage for students' mathematics skills development in secondary school (Akinoso, 2018); randomised controlled study on interactivity and multimedia in distance learning (Leszczyński et al., 2018); the analysis of eye-tracking research on multimedia learning (Alemdag and Cagiltay, 2018); describing the advantages of computer multimedia-aided English studying (Guan et al., 2018); developing multimedia practicum on physics based on problem-solving material for science process skills (Kurniawan et al., 2019); the effectivity of multimedia-assisted means for teaching English pronunciation Mahdi, 2019); creating interactive multimedia vocational high school students' teaching with the aim of psychomotor domain developing (Nugraha and Wahyono, 2019); the research of multimedia e-learning and self-regulated science learning (So et al., 2019).

In recent years, there has been growing interest in different aspects of multimedia implementing, in particular: the importance of multimedia instructions on primary school pupils' motivation in Croatia (Lauc et al., 2020); introduction of interactive multimedia in the process of improving students' critical thinking skills (Abdulah et al., 2021); using the ocentric approach and interactive multimedia for the analytical thinking skills of primary school pupils in science learning (Lubis et al., 2021); describing multimedia simulation-based architecture cad system model (Ma, 2021); creating multimedia simulation model for electrical laboratory learning (Sriadhi et al., 2021); developing multimedia technology practicum on digital learning based on cognitive style (Mertayasa et al., 2022); developing higher education teaching staff digital and multimedia skills (De Juana-Espinosa et al., 2023); proving the importance of a media data interaction system on the teaching process (Ke and Ji, 2023); improving the skills of vocational school students by means of managing multimedia as an ICT-based learning (Roemintoyo and Wibawanto, 2023); computer multimedia simulation as a means of gear reducer optimal designing (Sun et al., 2020).

C.-C. Kao, Y.-J. Luo (2020) proved the importance of multimedia-based teaching on students' knowledge and behaviour in physical education lessons on the example of basketball game recording usage.

I. Fuady, M. A. Sutarjo, and E. Ernawati (2021) analyzed students' perceptions during online learning media in the conditions of the COVID-19 pandemic based on E-learning using Zoom, Google Meet, Google Classroom, and LMS.

The research (Zin et al., 2012) evaluates the interdependence between multimedia implementation and learners' motivation. Moreover, the authors emphasize the effectiveness of multimedia studying usage as a means of ideas exploration in learning needs. They proved multimedia technology assists in motivating students while studying in Malaysia which has supported teachers to develop ideas and experiences.

Another paper (Abdulrahaman et al., 2020) is an analysis of modern multimedia means in the educational processes to examine how multimedia technologies provide open access to high-quality education. The scientists outline how they used multimedia to teach students, describe the reports of multimedia means, their advantages and disadvantages, using areas, evaluation methodologies, and technology components. The authors focus on the issue that proposed means were found to have multimedia components such as audio, video, animation and 3-D. The conclusions of the study proved that the major part of the multimedia used for educational purposes is aimed at the learning content of the subject and students' audience interest.

The group of researchers (Budiharso et al., 2020) drew our attention to the fact for better quality of education, the working conditions of the educational institutes are very important. In the study, the author studies the impact of working conditions on quality education. To analyse the gathered data, confirmatory factor analysis and structural equation modelling approaches have been used. In addition, some limitations and future research indications have also been described.

The researcher (Aljazzaf, 2020) tries to outline the significant factors that influence multimedia implementation in the educational process. This study defines the factors that affect the multimedia technologies usage in teaching English in Kuwait. The scientists maintain that seven factors impact multimedia usage in teaching a foreign language, which are: facilitation, motivation, performance, behavioural, social, pedagogical, and effort factors. Moreover, the study proves that teachers have positive attitudes to multimedia technologies, but they need more support.

The scientists (Ke and Ji, 2023) improved the media data interaction system to aid the teaching and developed system courseware through such methods as scientific literature data, experiment methods and questionnaires. They have tended to focus on the media data interaction system as the result of the joint creation of a new system using information and computer technologies, which has a certain impact on the traditional educational model. It has been proved; that the new media data interaction system has a great effect on improving the course teaching.

The paper (Choiriyah et al., 2022) is based on assessing the efficacy of multimedia learning in early childhood distance learning. The results confirmed that multimedia-based learning for distance learning could develop critical thinking skills in early childhood children during the COVID-19 pandemic. Moreover, the authors offer an exploration of learning strategies to improve children's critical thinking.

In another study (Roemintoyo et al., 2022) the advances are traced in creating interactive multimedia that are appropriate for educational activities usage. The main method in the study is research and development (R&D) which adopts the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The results showed that learners are very interested in developing interactive multimedia. The researchers claim that interactive multimedia is contained in the proper category as an educational media.

AIMS

The analysis of the above-mentioned scientific sources asserts that different aspects of the searched issue have been studied quite thoroughly. However, given the constant rapid change of the world of innovations, it is worth noting the need to study new multimedia technologies that are constantly updated and improved. Therefore, this paper aims to research the peculiarities of multimedia technologies' influence in improving the quality of education in Ukraine.

To achieve the general research aim, we should realize the following tasks in stages:

1. to determine the most important factors affecting the quality of education in Ukraine;
2. to study the current state of multimedia technology usage to improve the learning process in the Ukrainian educational establishment.

METHODS

To achieve the purposes of the research, a set of methods of data collection was used: theoretical: analysis of scientific and methodical sources; empirical: observation of the educational process, questionnaires, interviews, conversation and focused group discussion; statistical; graphic.

Primary data was collected with the help of a questionnaire and expert surveys. The study found that Ukrainian teachers have positive views toward using multimedia technologies in the educational process.

Secondary data was collected from leading research databases, articles and other secondary sources. So, to complete a detailed understanding of the issue, we analysed scientific sources according to modern

education technologies. In the paper principles, and meeting procedures to identify supplementary information addressing the factors related to the subject of this study were determined. Therefore, our search resulted in the identification of the most critical elements of multimedia technologies in education today. Furthermore, we implemented a survey to understand the view of the educational community regarding modern multimedia technology usage. Before conducting the survey, we advised experienced specialists to ensure that the examination is sufficient, satisfactory, and appropriate. We adapted the study survey according to their expert views, including proper variables for the investigation and excluding some traditional or irrelevant elements.

Teachers from different branches, levels of education and with different work experience participated in the study. Most of them are women (83%). The same number consists of teachers from different levels of education - primary, secondary, high school and higher education - respectively 25% each. All respondents can be divided into 2 large groups according to the experience of pedagogical work: 1 - Young teachers (work experience up to 10 years) make up about 32% and experienced teachers (more than 10 years) - 68%.

The methodology of expert assessment was implemented to rate key factors affecting the quality of education in Ukraine. To ensure the reliability of the obtained data, independent competent experts of the same qualification (everybody has a PhD and teaching experience of more than 5 years) were involved. Compliance with the requirement of probability was aimed at equalizing the basic conditions for conducting a pedagogical experiment in the real conditions of the educational process.

RESULTS AND DISCUSSION

The quality of education in Ukraine

The quality of education in Ukraine, like in any country, is influenced by a combination of factors that can have both positive and negative impacts. These factors can vary across different regions and educational institutions within Ukraine, but the research results outline some of the key factors affecting the quality of education in Ukraine.

1. Funding and Resource Allocation: adequate funding is crucial for maintaining and improving the quality of education. Budget constraints can lead to outdated facilities, insufficient teaching materials, and low teacher salaries.
2. Teacher Quality: the competence, qualifications, and motivation of teachers play a significant role in the quality of education. High turnover rates, inadequate teacher training, and low salaries can affect the quality of teaching.
3. Curriculum and Educational Standards: the content and relevance of the curriculum, as well as adherence to educational standards, impact the quality of education. Regular updates and alignment with global best practices are important.
4. Access to Education: ensuring equitable access to education for all students, regardless of their socioeconomic background or geographical location, is crucial. Disparities in access can lead to unequal educational outcomes.
5. Infrastructure and Facilities: The current condition of some school buildings, classrooms, and equipment in Ukraine affect negatively to the learning environment. Inadequate infrastructure can hinder effective teaching and learning.
6. Educational Technology: integration of technology into the classroom can enhance the quality of education. Access to modern educational technology can be limited in some areas.
7. Standardized Testing and Assessment: the quality of assessment methods used in education can impact the overall quality of the system. Fair and reliable assessments are essential for evaluating student progress and program effectiveness.
8. Corruption and Accountability: corruption within the education system can divert resources and undermine the quality of education. Ensuring accountability and transparency in educational institutions is important for maintaining quality.
9. Political and Social Stability: political and social unrest can disrupt the education system and hinder the quality of education. Stability is essential for creating a conducive learning environment.
10. Economic Factors: the overall economic health of the country can impact education. Economic downturns can lead to reduced government funding for education.

11. Parental Involvement: the involvement of parents in their children's education can have a positive impact on learning outcomes. Encouraging parental engagement is important for improving quality.
12. International Collaboration: collaboration with international organizations and universities can bring in expertise, resources, and best practices to improve the quality of education.

Taking into account the fact of wartime conditions in Ukraine nowadays, it is worth noting that most of the above-mentioned factors affect negatively the quality of contemporary education in Ukraine, in particular, funding and resource allocation, infrastructure and facilities, educational technology, political and social stability, economic factors do not contribute to high-quality education.

It's important to note that these factors are interconnected and can vary in their significance depending on the specific context within Ukraine. Improving the quality of education in Ukraine requires a holistic approach that addresses multiple factors simultaneously and involves stakeholders at various levels, including the government, educators, parents, and the community.

The next step of our research was to rate the factors affecting the quality of education and determine the ways of improving the quality of education in Ukraine. They are given in the

Table 1. Rating of the factors affecting the quality of education in Ukraine.

Rating	Factors affecting the quality of education in Ukraine	The way of improving the quality of education in Ukraine
1	Funding and Resource Allocation	Allocating sufficient funding to the education sector to ensure adequate resources for schools and teachers. Monitoring and transparently managing education budgets to prevent corruption.
3	Teacher Quality	Investing in teacher training programs to enhance their pedagogical skills and knowledge. Encouraging ongoing professional development and support for teachers.
6	Curriculum and Educational Standards	Regularly updating and modernizing the curriculum to ensure it meets the needs of a changing society and economy. Emphasizing critical thinking, problem-solving, and practical skills alongside traditional academic subjects. Investing in early childhood education to ensure a strong foundation for future learning and development.
11	Access to Education	Addressing disparities in access to education, especially in rural and disadvantaged areas. Improving infrastructure and resources in schools to create a conducive learning environment.
8	Infrastructure and Facilities	Promoting the integration of technology in classrooms to enhance teaching and learning. Ensuring equitable access to digital resources and devices for all students.
2	Educational Technology	Promoting education research to inform evidence-based policy decisions. Encouraging innovative teaching methods and educational practices.
4	Standardized Testing and Assessment	Implementing fair and transparent assessment methods to measure student progress and school performance. Using assessment data to identify areas of improvement and tailor educational strategies accordingly.
10	Corruption and Accountability	Establishing rigorous quality assurance mechanisms for schools and educational programs. Holding educational institutions accountable for their performance through regular evaluations.
7	Political and Social Stability	Fostering partnerships between schools and local organizations for community-based learning initiatives. Introducing civic education programs to foster citizenship, tolerance, and democratic values among students. Developing policies and practices that promote inclusive education for students with disabilities. Training teachers to accommodate diverse learning needs in their classrooms.
5	Parental Involvement	Encouraging parents and communities to take an active role in supporting education.
9	International Collaboration	Collaborating with international organizations and partners to access expertise and resources for educational reform. Exchanging the best practices with countries that have successfully improved their education systems.

Source: compiled by the authors.

The above-mentioned factors affecting the quality of education can be divided into 3 large groups: social, educational and technological. The conducted research made it possible to determine the most influential factors. Social and education have the greatest influence, which is approximately the same percentage - 40.1% and 43.8%, respectively. Technological factors have a much smaller impact on the quality of education in Ukraine (16.1%) (see Figure 1).

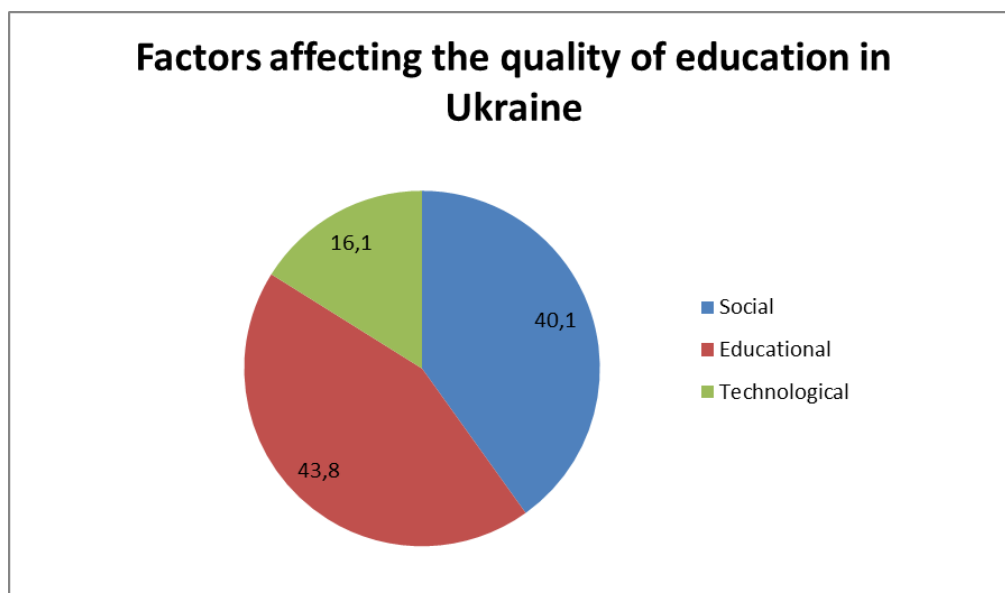


Figure 1. Factors affecting the quality of education in Ukraine.
Source: compiled by the authors.

Improving the quality of education in Ukraine is a complex and multifaceted challenge that requires concerted efforts from various stakeholders, including the government, educational institutions, teachers, parents, and the wider community. Improving the quality of education in Ukraine is a long-term endeavour that requires sustained commitment, collaboration, and ongoing evaluation of progress. It is essential to engage all stakeholders in a collaborative effort to create a more effective and equitable education system that prepares students for the challenges of the 21st century.

Multimedia as the means of improving the quality of education in Ukraine

In Ukrainian education, the term “multimedia” is commonly used to refer to the use of various forms of digital media and technology to enhance the learning process. Multimedia in education can encompass a wide range of tools and resources, including:

- Digital presentations: Teachers often use multimedia presentations, such as PowerPoint slides or interactive slideshows, to convey information to students visually and engagingly.
- Video and audio materials: educational videos, podcasts, and audio recordings are frequently used to supplement classroom instruction and provide students with different modes of learning.
- Interactive software: Multimedia educational software and applications are used to create interactive learning experiences, such as simulations, educational games, and virtual labs.
- Online resources: The internet provides access to a vast array of multimedia educational resources, including online textbooks, articles, videos, and interactive tutorials.
- E-learning platforms: Many educational institutions in Ukraine utilize e-learning platforms and learning management systems that incorporate multimedia elements to deliver course content and facilitate online learning.
- Virtual reality (VR) and augmented reality (AR): In some advanced educational settings, VR and AR technologies are used to create immersive learning experiences that can enhance students' understanding of complex concepts.
- Webinars and video conferences: Multimedia tools are used for webinars and virtual meetings, enabling educators to conduct remote lectures and discussions with students.

- Digital assessments: Multimedia elements, such as multimedia quizzes and interactive assessments, can be used to evaluate students' knowledge and skills.
- Digital libraries: educational institutions often provide access to digital libraries and online databases, where students can find multimedia resources to support their research and studies.

Overall, multimedia in Ukrainian education plays a crucial role in making learning more engaging, interactive, and accessible, helping students better understand and retain information through various digital media formats. The specific use and integration of multimedia tools may vary depending on the level of education (e.g., primary, secondary, and higher education) and the resources available to educational institutions.

The research made it possible to divide the above-mentioned multimedia means according to usage by teachers of different educational levels in Ukraine (Figure 2).

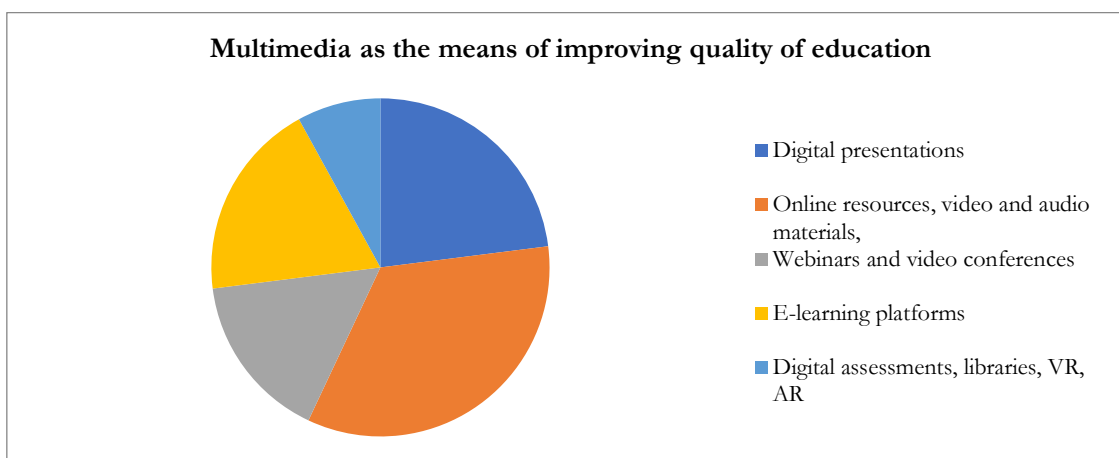


Figure 2. Division of multimedia means according to usage in educational establishments in Ukraine.
Source: compiled by the authors.

Multimedia means, including audio, video, graphics, and interactive content, can significantly enhance the quality of education in various ways. Here are several key reasons why the usage of multimedia is important in improving educational quality:

- **Enhanced Engagement:** multimedia materials are often more engaging and captivating than traditional text-based resources. Incorporating videos, animations, and interactive simulations can capture students' attention and keep them more focused on the learning material.
- **Improved Comprehension:** visual and auditory elements in multimedia help students better understand complex concepts. Visual aids, such as diagrams and charts, can simplify abstract topics, making them more accessible to learners.
- **Catering to Diverse Learning Styles:** people have different learning preferences, including visual, auditory, and kinesthetic learning styles. Multimedia allows educators to cater to a variety of learning styles, increasing the chances of students grasping and retaining information.
- **Increased Retention:** studies have shown that multimedia can lead to better retention of information. Combining text with visuals or videos can enhance memory and recall, resulting in more effective learning.
- **Fostering Critical Thinking:** multimedia can stimulate critical thinking skills by presenting information from different perspectives and encouraging students to analyze, evaluate, and draw conclusions from multimedia content.
- **Real-world Application:** multimedia can bring real-world scenarios into the classroom, helping students understand how theoretical knowledge applies to practical situations. This connection to the real world can make learning more relevant and meaningful.
- **Accessibility:** multimedia materials can be adapted to suit the needs of diverse learners, including those with disabilities. Closed captioning, audio descriptions, and other accessibility features can make educational content more inclusive.

- **Global Learning:** multimedia allows students to access resources and perspectives from around the world. It promotes cultural awareness and can facilitate cross-cultural understanding, which is important in an increasingly interconnected world.
- **Self-paced Learning:** multimedia can be used in self-paced or online learning environments, allowing students to learn at their own pace and revisit content as needed. This flexibility accommodates different learning speeds and preferences.
- **Assessment and Feedback:** multimedia can be used for formative and summative assessments. Interactive quizzes, simulations, and multimedia presentations enable teachers to assess student understanding more comprehensively and provide timely feedback.
- **Motivation and Interest:** multimedia content can make learning more enjoyable and motivating. Students are more likely to be enthusiastic about lessons that incorporate multimedia, which can lead to increased participation and effort.
- **Preparation for the Digital Age:** in today's digital world, proficiency with multimedia tools and resources is a valuable skill. Integrating multimedia into education prepares students for future careers where technology literacy is essential.
- **Personalization:** multimedia can be tailored to individual student needs and interests, enabling personalized learning experiences. Adaptive learning platforms use multimedia to adjust content based on a student's progress and performance.

In summary, the use of multimedia in education offers a dynamic and effective way to enhance the quality of learning experiences. When used thoughtfully and strategically, multimedia can help students better understand, retain, and apply knowledge, ultimately improving the overall quality of education.

It's important to note that many academics are embracing multimedia technologies as a valuable means for improving the quality of education. Over time, their benefits become more apparent and educators' attitudes evolve. Therefore, our research deals with new findings regarding multimedia technology usage. The issue of using multimedia technologies became especially important after the start of the 2019 coronavirus pandemic and the war in Ukraine. The works of G. Peconio, M. di Furia, P. Limone, and A. Fornasari (2023) revealed that incorporating multimedia technologies in education has a positive impact on the quality of education in different levels of institutes. Our research confirms the previous results (Teguh and Bulent, 2020) and proves that multimedia means implementation has both positive and negative impacts on educational processes, and a balanced approach is recommended for a productive educational process. Moreover, the study is in good agreement with F. Rahmawati and Z. H. Ramadan (2021) the evidence we found points to the main multimedia means as a way of improving the quality of education in Ukraine.

CONCLUSION

In conclusion, in the paper we have presented the study of the peculiarities of multimedia means usage intending to improve the quality of education at institutions in Ukraine. According to the purpose of the study, we implemented some tasks.

We have determined the most important factors that impact the quality of education at different educational levels: funding and resource allocation, teacher quality, curriculum and educational standards, access to education, infrastructure and facilities, educational technology, standardized testing and assessment, corruption and accountability, political and social stability, parental involvement, international collaboration. They can be divided into 3 groups: social, educational and technological. The most influenced are educational factors. Technological factors have a much smaller impact on the quality of education in Ukraine.

We have studied the current state of multimedia means usage to improve the learning process in Ukrainian educational establishments. The research shows the most useful multimedia technologies for contemporary educational processes are digital presentations, online resources, video and audio materials, webinars and video conferences, e-learning platforms and digital assessments.

Our work has led us to conclude about the importance of multimedia means usage for effective educational process.

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