

ORIGINAL

The Use of Digital Technologies in Primary Education through the Prism of Potential and Challenges

El Uso de las Tecnologías Digitales en la Educación Primaria desde la Perspectiva del Potencial y los Retos

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ABSTRACT

Introduction: current trends in primary education dictate the need to integrate innovative tools and approaches. The aim of this article is to analyze their potential advantages and challenges.

Method: the study examines innovative pedagogical tools based on digital solutions: online platforms, interactive tools, gamification and storytelling, immersive virtual and mixed reality technologies. As part of the study, a pedagogical experiment was conducted involving elements of virtual reality technologies in primary school fire safety education using the FLAIM Systems VR program.

Results: the main advantages of innovative technologies were identified, including increased student interest and motivation, improved learning, variety of methods for presenting educational information, integration of different learning styles to form an individual approach in primary education, and the possibility of taking inclusion into account. The risks of active use of technologies in primary school were identified, including the likelihood of information overload for children, a decrease in their attention and concentration, risks of negative health effects, the development of excessive dependence on technologies, and a deterioration in social interaction between students.

Conclusions: it has been proven that visualization and interactive experience allow explaining complex abstract concepts to children in a practical and intuitive way, which facilitates the assimilation of material, increases the effectiveness of learning the necessary skills and abilities, actively involves the emotional and sensory sphere, and develops critical thinking.

Keywords: Methodology; Primary Education; Immersive Technologies; Future Teachers; Interactive Technologies; Innovative Elements; Natural Sciences and Mathematics.

RESUMEN

Introducción: las tendencias actuales en la educación primaria dictan la necesidad de integrar herramientas y enfoques innovadores. El objetivo de este artículo es analizar sus posibles ventajas y retos.

Método: el estudio examina herramientas pedagógicas innovadoras basadas en soluciones digitales: plataformas en línea, herramientas interactivas, gamificación y narración de historias, tecnologías inmersivas

de realidad virtual y realidad mixta. Como parte del estudio, se llevó a cabo un experimento pedagógico que incluía elementos de tecnologías de realidad virtual en la educación sobre seguridad contra incendios en la escuela primaria utilizando el programa FLAIM Systems VR.

Resultados: se identificaron las principales ventajas de las tecnologías innovadoras, entre las que se incluyen el aumento del interés y la motivación de los alumnos, la mejora del aprendizaje, la variedad de métodos para presentar la información educativa, la integración de diferentes estilos de aprendizaje para formar un enfoque individual en la educación primaria y la posibilidad de tener en cuenta la inclusión. Se identificaron los riesgos del uso activo de las tecnologías en la escuela primaria, entre ellos la probabilidad de sobrecarga de información para los niños, la disminución de su atención y concentración, los riesgos de efectos negativos para la salud, el desarrollo de una dependencia excesiva de las tecnologías y el deterioro de la interacción social entre los alumnos. o no estructurado, con una extensión no mayor a 250 palabras; redactado en pasado y en tercera persona del singular.

Conclusiones: se ha demostrado que la visualización y la experiencia interactiva permiten explicar conceptos abstractos complejos a los niños de una manera práctica e intuitiva, lo que facilita la asimilación del material, aumenta la eficacia del aprendizaje de las habilidades y destrezas necesarias, involucra activamente la esfera emocional y sensorial, y desarrolla el pensamiento crítico.

Palabras clave: Metodología; Educación Primaria; Tecnologías Inmersivas; Futuros Docentes; Tecnologías Interactivas; Elementos Innovadores; Ciencias Naturales y Matemáticas.

INTRODUCTION

The modern strategy for the development of education determines the key requirements for the content of education and the methodology of the educational process, which should ensure maximum consideration of the individual needs and abilities of students, and the development of their creativity and critical thinking. Achieving this goal is made possible by the active use of modern technological capabilities, including interactive tools, digital platforms, and virtual immersive environments. In addition to methodological and pedagogical functions, innovative technologies contribute to the optimization of the communication process, the development of social and digital competencies in students, and form the basis for the formation of sustainable motivation to learn.

This issue has received considerable attention from researchers in an interdisciplinary context. The authors^(1,2,3) analyze the dynamics of technological opportunities in the educational context in the primary school environment - media education, gamification, mobile learning applications, and interactive platforms. Yang⁽⁴⁾ explores the potential of immersive environments for creating realistic learning experiences. A number of researchers⁽⁵⁾ are studying innovative ways of developing key skills and abilities in primary school students in a digital environment using project-based methodology and a case study approach.

Modern educational technologies assimilate the potential of creative communication, integrated implementation of problem-based and contextual learning, and a dialogical approach. The training of primary school teachers should now combine the development of sustainable professional competencies, digital skills, and readiness to work with inclusion. In addition, future primary school teachers should have a desire for continuous self-improvement and professional growth, active integration of modern educational solutions, and use of the potential of information technologies.

The right choice of teaching technologies for primary schools determines the success of the educational process, and therefore the relevance of extensive research into modern technological opportunities in the educational process - immersive virtual reality technologies, storytelling, and gamification based on digital platforms - is beyond doubt.

The aim of this article is to consider the peculiarities of integrating innovative elements of modern technologies into the educational process of primary schools in the context of potential advantages and related challenges.

The views of scholars within the scope of the research problem are characterized by contrasting conceptual perspectives. In particular, Gabarda Méndez et al.⁽⁶⁾ consider teachers' digital skills to be the foundation for the effective integration of technology into the educational process. Haleem et al.⁽⁷⁾ emphasize the role of online platforms for the development of primary schools in a modern context. Criollo-C et al.⁽⁸⁾ consider the potential of mobile learning in the context of developing students' creative abilities and communicative competence. According to Rasmitadila et al.⁽⁹⁾, the formation of sustainable professional competence of teachers and their readiness for innovation and continuous self-improvement require an adequate methodological basis, which should be provided for in professional training programs.

The publications by Chiu⁽¹⁰⁾ and Gizaw and Tessema⁽¹¹⁾ suggest making maximum use of the possibilities

offered by modern information systems, such as interactive platforms, gamification, storytelling, and online tools. According to the authors, such tools help to increase student motivation and interest, improve the quality of lessons, and enable the integration of a comprehensive learning approach in primary schools.

The results of scientific research by Demitriadou et al.⁽¹²⁾ attribute special potential to the method of immersive learning and elements of gamification, which contribute to the development of logical and critical thinking in students, problem-oriented learning skills through the reproduction of a gaming environment natural for younger school age children.

Halan et al.⁽¹³⁾ note that professional training programs for primary school teachers should be practical in terms of innovatively improving the teaching skills of future teachers, actively involving digital tools, and developing inclusion and cross-cultural competencies. Hanif⁽¹⁴⁾ analyzes the main problems of the primary teacher training system in the context of the inclusive component and emphasizes the need to integrate modern digital solutions into inclusive practices.

Spiteri and Chang Rundgren⁽¹⁵⁾ investigate a practice-oriented learning system for developing logical thinking, verbal communication skills, and critical evaluation, which is successfully achieved through modern interactive technologies. At the same time, Pavlou⁽¹⁶⁾ emphasizes the impact of the digital educational field on students' cognitive sphere, the development of their information and digital competence, and the expansion of their logical thinking and reflection skills.

Despite the active scientific interest in the subject under study, a critical analysis of the potential challenges and advantages of integrating innovative educational technologies into primary education requires a broader approach and updating in light of contemporary challenges.

METHOD

The study mainly involved a systematic and comprehensive analysis of scientific publications, research papers, and major global security trends based on industry statistics. The analysis approach included thematic coding.

Given the practical realities, the sample size was deemed appropriate, ensuring sufficient scientific and statistical power. To reduce internal bias in the publications used for this study, an open access and data reuse strategy was applied. This involved providing access to the full study data, including raw data and code, allowing the results to be verified and further analysis to be conducted if necessary, thereby reducing the impact of bias.

Key recommendations for systematic reviews (PRISMA 2020) were used

The main materials for the study were selected industry publications indexed in leading scientific databases (Web of Science, Scopus), as well as statistics from official sources. The sample period was 2019-2025.

Search engines such as Google Scholar were used to effectively search for information during the study. Queries were formulated by selecting relevant keywords, and clarifying questions or commands were used to narrow down the search results. For a more in-depth analysis, results from various sources were reviewed, paying attention to the quality of the information.

Search strings are phrases that were entered into search engines (Google Scholar) to find scientific information and research results. An effective search query for the study involved identifying keywords: basic terms related to the research topic; synonyms and related terms to cover a wider range of sources; specific terms (names of methods, authors, terms, etc.). The keywords for the search were “methodology, primary education, immersive technologies, future teachers, interactive technologies, innovative elements, natural sciences and mathematics,” as well as related and synonymous terms.

The date of the last search was July 2025.

The criteria for inclusion and exclusion of publications were spatial and temporal indicators and the level of reliability of the information. The criteria for assessing the quality of sources were the relevance and objectivity of the publication, the completeness of coverage of the topic, and authority. The process of removing duplicate studies involved identifying duplicate records through queries and then deleting them. Steps for removing duplicates: defining uniqueness criteria (study title, DOI, author), searching for duplicates (writing an SQL query), and deleting them.

The analytical structure used – thematic analysis – is a qualitative research method that involved reading the data, coding it to identify recurring ideas, and then categorizing and interpreting these codes to identify main themes, allowing for a deep understanding of the participants' experiences and views.

RESULTS

In light of the key goal of the modern educational concept—the comprehensive development of the child's personality—primary school teachers must possess innovative thinking and creativity, and the learning process

itself must be integrated and inclusive, providing for a variety of forms of presenting educational material, the implementation of digital solutions, multimedia technologies, and interactive elements. At the same time, teachers should create a favorable psychological microclimate for the effective implementation of innovations, combining elements of traditional and digital education, and helping students adapt to new forms of interaction.⁽⁶⁾

Against the backdrop of the modernization of primary education, innovations are, in essence, the result of the search for original and non-standard solutions to various pedagogical problems. The structure of teaching includes interactive technologies, the essence of which is expressed in the most effective interaction between students. In general, pedagogical approaches in primary education that increase the effectiveness of learning and the formation of necessary skills include:^(7, 10, 11)

- Interactive technologies that enable the implementation of practice-oriented learning strategies.
- Gamification elements - creating a learning environment in a playful form accessible to younger students.
- Audiovisualization - using multimedia technologies to help students learn through visual nonverbal cues.
- Mind maps and sequence diagrams, which effectively develop critical thinking, logical-verbal skills, and communication.
- Personalization - an individual approach increases student motivation, promotes adaptation, and allows students to choose their own pace of learning.
- Group interaction, which develops communication skills through active exchange of ideas, zigzag reading, interviewing, project work, dialogue-based learning, etc.

In the context of learning English in primary school, gamification and storytelling are considered effective technologies that involve individual, partner, and group work, encouraging students to actively participate in class, developing their language skills, creativity, and imagination, and teaching them to interact in a team.

There are different ways to use storytelling. To make storytelling work, teachers need to pick the right story, build it up in a logical way, and use techniques to help students learn how to express their own take on the story. Digital storytelling is becoming really popular in English teaching. In particular, with the help of the digital tool My StoryMaker, it is possible to independently create a simple story in the form of a book by choosing the main character, their goal, and the means of achieving it.

For younger schoolchildren, it seems appropriate to use online platforms for creating their own creative stories, such as My Storybook and ZooBurst. The My Storybook platform allows children to write their own stories and supplement them with images from free templates. ZooBurst, on the other hand, allows children to create their own 3D pop-up books. It is currently important to encourage younger students to read actively. Digital storytelling is considered an effective method for developing communication skills in this regard, as listening to and retelling stories and recording their elements form essential general language skills.

Special attention should be paid to innovative educational games for learning English. These games demonstrate high effectiveness in consolidating and systematizing knowledge and promote awareness of lexical units in the context of grammar learning. The development of critical thinking, attention, memory, and information processing speed stimulated by educational games also has an educational character.

Among educational games for learning English, Anitemdescription, Chainstory, and Grabaminute have proven their practical effectiveness (table 1). It should be noted that game technologies can be used by teachers at all stages of the lesson. In particular, at the beginning of the lesson, games serve to introduce students to the learning environment and check what they have learned; during the lesson, they are used to hone skills; and at the end, they serve as a reflection and a way to relieve tension.

An extended description of modern technologies for teaching in primary school is given in table 1.

The practical experience of developed European countries is considered representative in the aspect under study (figure 1). At the same time, the dynamics in the period 2021-2023 are indicative.

Table 1. Innovative technologies in primary education

Type of technology	Decision	Characteristics
Online platforms	Kahoot	An educational platform for conducting quizzes, creating tests, and educational games. Convenient to use in all lessons. Available in both free and paid versions.
	Flippity	A collection of digital tools to help in creating interactive exercises and tasks in a game format.
	Matific	An online educational resource that increases math performance by an average of 34 %. Interactive math exercises created by experts for students in grades 0-6.

Distance learning	HUMAN	A convenient system for electronic document management, conducting online lessons, submitting and checking homework, receiving feedback from students, and communicating. Teachers can create their own lessons on the platform and use them later. The basic version of the program is free, and its functionality is sufficient for distance learning.
	Google classroom	A free web service created by Google for educational institutions, where teachers can create and check assignments that are stored in separate folders for each student on Google Drive.
	MOODLE	A learning platform where one can present educational material in various formats (text, presentation, video, web page); test and survey students using closed and open-ended questions.
Gamification	Educational game Anitemdescription	Focused on describing words or phrases that are indicated on interactive cards.
	Irpoteka ALPA Kids	The ALPA game library is based on a curriculum for young children and promotes the development of language, math, and other essential skills. ALPA also improves skills such as motor skills, curiosity, problem solving, creativity, and more.
	Educational game Chainstory	A game of logic and individualization
	Educational game Grabamminute	A game in which one has 1 minute to effectively represent a word written on an interactive map.
Mobile applications	Kahoot	A game-based learning platform where games are created in the format of tests with multiple choice answers. The test can be accessed via a web browser or the Kahoot! app.
Interactive technologies	Liveworksheets	Allows converting traditional printable sheets (doc, pdf, jpg...) into interactive online exercises with self-correction, which is called "interactive sheets." They can contain sounds, videos, drag-and-drop exercises, arrow-based merging, multiple choice, and even speaking exercises that students must complete using a microphone.
	LearningApps	A free platform that allows creating interactive games and exercises on various subjects. One can add photos, images, sound, or video to the exercises. The platform already has ready-made tasks that can be edited.
Audiovisualization	Nearpod	An online platform for creating live lessons. If one uses the full version of the program, one can design an online lesson by adding PowerPoint presentations, creating their own slides with audio and video, images and text, and inserting videos from YouTube.
	Padlet	A multimedia resource where one can create, edit, and store information free of charge. It is a virtual wall where it is possible to post photos, files, links to web pages, and notes.
Intelligence maps and sequence diagrams	Draw.io	This is a free multifunctional service with a fairly simple interface. With its help, it is possible to create mind maps, various diagrams, tables, flowcharts, simple infographics, and presentations.
	Canva	The unique designer allows using the built-in editor with over 220 templates to create the mental map project of their own - change colors, text, fonts, and add the necessary visual elements, including GIF files and videos.

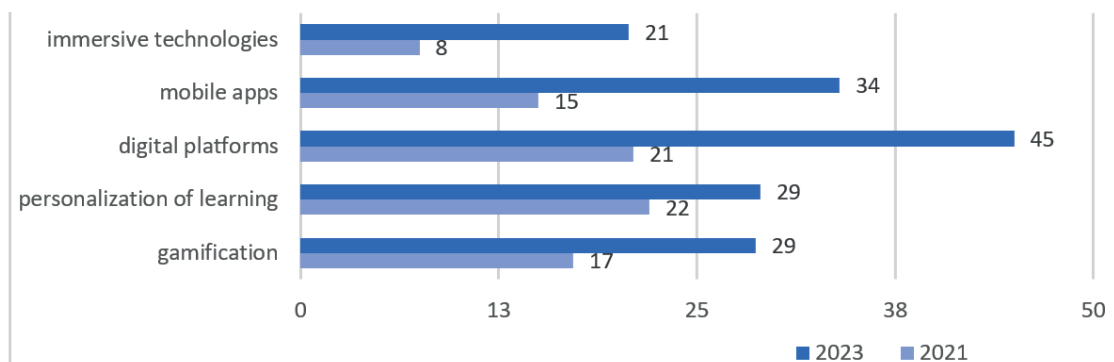


Figure 1. Dynamics of the level of implementation of innovative educational tools in primary schools in EU countries, 2021-2023 %⁽¹⁷⁾

As shown in figure 1, which reflects the results of the Global Education Monitoring Report (UNESCO) for the period 2021-2023, there is a steady positive trend in the level of integration of modern technologies into the primary education process in EU countries (the level of use of immersive technologies increased from 7,5 % in 2021 to 20,7 % in 2023, mobile applications - from 15 % in 2021 to 34 % in 2023, digital platforms - from 21 % in 2021 to 45 % in 2023, personalization of learning - from 22 % in 2021 to 29 % in 2023, gamification - from 17,2 % in 2021 to 28,7 % in 2023). Thus, in 2023, the top three digital learning technologies are: digital platforms (45 %), mobile applications (34 %), and gamification tools (28,7 %).

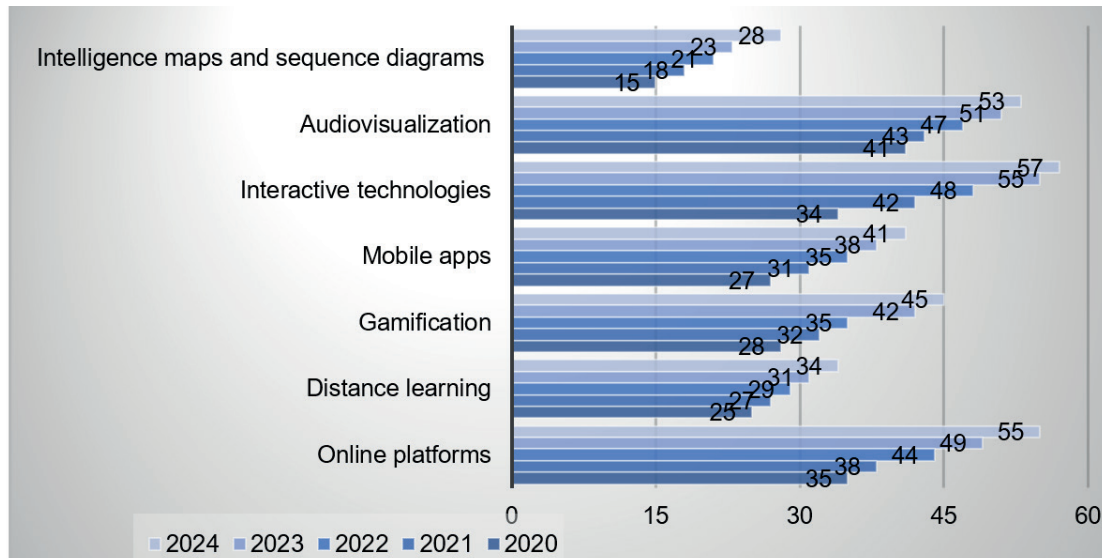


Figure 2. Use of innovative teaching technologies in primary education in EU countries, 2020-2024, % of schools⁽¹⁸⁾

As shown in figure 2, which reflects statistical information from Primary education statistics,⁽¹⁸⁾ interactive technologies gained particular popularity in primary schools in EU countries during the period 2020-2024 (from 34 % in 2020 to 57 % in 2024). Interactive technologies (from 34 % in 2020 to 57 % in 2024 - an increase of 23 %), mobile applications (from 27 % in 2020 to 41 % in 2024 - an increase of 14 %), online platforms (from 35 % in 2020 to 55 % in 2024 - an increase of 20 %), gamification (from 28 % in 2020 to 45 % in 2024 - an increase of 17 %). The remaining items also show steady growth in integration rates (intelligent maps by 13 % in 2020-2024, audiovisualization by 12 %, and distance learning by 9 %).

Noting the need to take inclusion into account in primary school, it is worth noting the impact of technology integration in primary education in EU schools according to several criteria (figure 3). This presentation, based on the results of international studies conducted between 2020 and 2023, shows statistics for aspects of individualisation of learning, communication development, socialisation and adaptability.

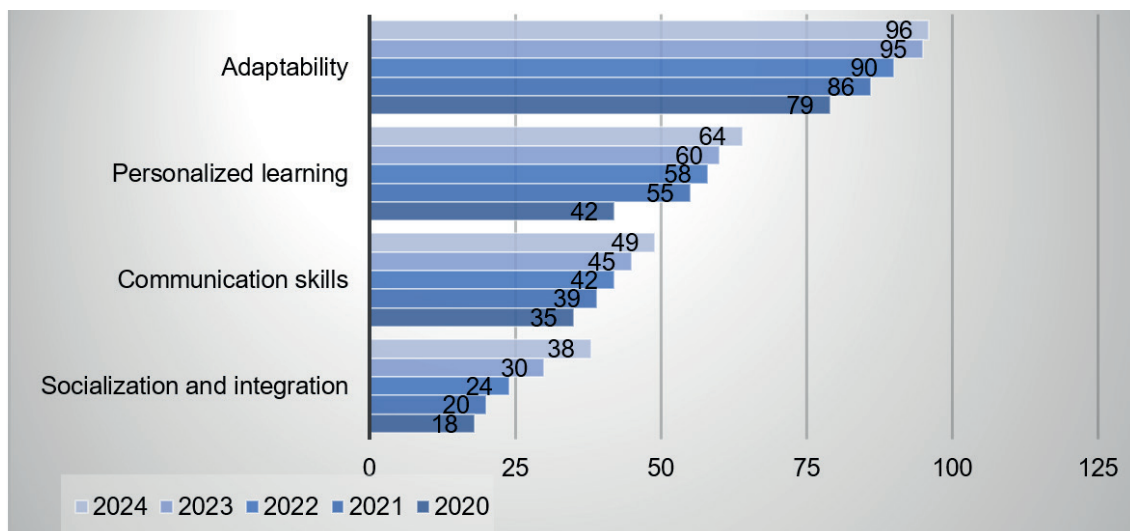


Figure 3. Impact of the use of educational technologies on primary education in EU countries, 2020-2024, level of effectiveness, % of students⁽¹⁸⁾

As shown in figure 3, innovative technologies have the greatest impact on the aspects of adaptability and individualization of learning, with a steady positive growth trend: from 79 % of students in 2020 to 96 % in 2024 for adaptability, and from 42 % in 2020 to 64 % in 2024 for individualization. In addition, the impact indicator in the context of student socialization and integration has increased by 20 %, which is particularly important for the development of inclusive primary education.

Analyzing the dynamics of the 2020-2024 period presented in figure 2 and figure 3, it can be argued that the growth of adaptability and individualization of primary education, the level of development of students' communication and social skills are determined by the effectiveness of the integration of innovative educational technologies.

The use of augmented reality to create engaging educational projects has promising potential. Immersive solutions allow students to better absorb material and develop creative abilities, significantly improving their understanding of natural sciences and environmental literacy. Immersive technologies are integrated into the educational process to improve learning and create an engaging experience. Situational virtual modeling allows students to experience learning material more deeply and engage with it, including on an emotional level. VR technologies form a set of effective practical tools that facilitate practical generalization, learning, visualized assimilation, spatial awareness of issues, intensification of cognitive activity, critical thinking, and creativity.

The experiment was conducted at a general education institution that implements innovative teaching methods - Lutsk Lyceum No. 21. To ensure the reliability of the study, two groups were selected from the 2nd grade student body: a control group (CG) and an experimental group (EG). The total sample size was 24 students. The number of students in the control and experimental groups was the same (12 children each). The children were aged 7-8 years.

The average learning coefficient values used for assessment were determined using formula (1):

$KN1 = A1/N1$ (1), where KN1 is the learning coefficient; A1 is the qualitative indicator of learning; N1 is the maximum possible result (in points) of qualitative training.

Before conducting the experiment, the initial level of the studied skills of younger students was assessed (figure 4).

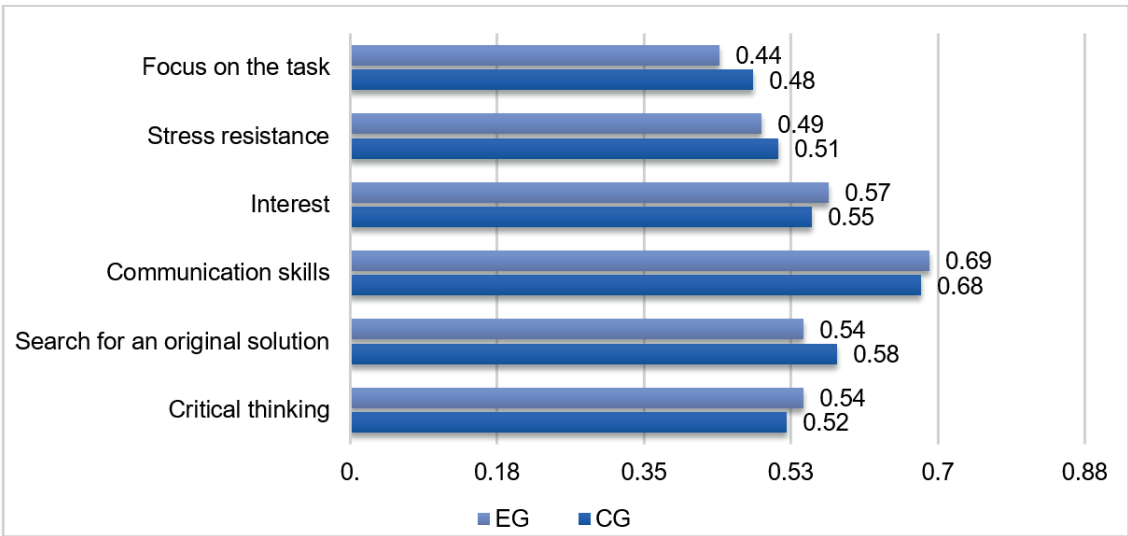


Figure 4. Initial skill level of students (based on learning coefficient)

As part of an experiment involving immersive technology for students, a lesson on forest fire prevention was conducted using a product developed by Australian startup FLAIM Systems - the FLAIM Trainer virtual reality firefighting training system. Through safe simulation of situations, the program allows users to experience a range of visual, emotional, and tactile sensations. A full-scale training room was used for the pedagogical experiment in the EG, which made it possible to implement 360° digital projection. When creating a character, students observe their actions during a fire, realizing the importance of measures to prevent similar situations.

Traditional teaching methods were used in the CG.

After the training, the dynamics of the students' skills in the EG and CG were re-analyzed, characterizing the level of knowledge and the ability to transfer skills to real scenarios related to preparing for actions in emergency situations during forest fires (figure 5). The questionnaire is provided in annex A.

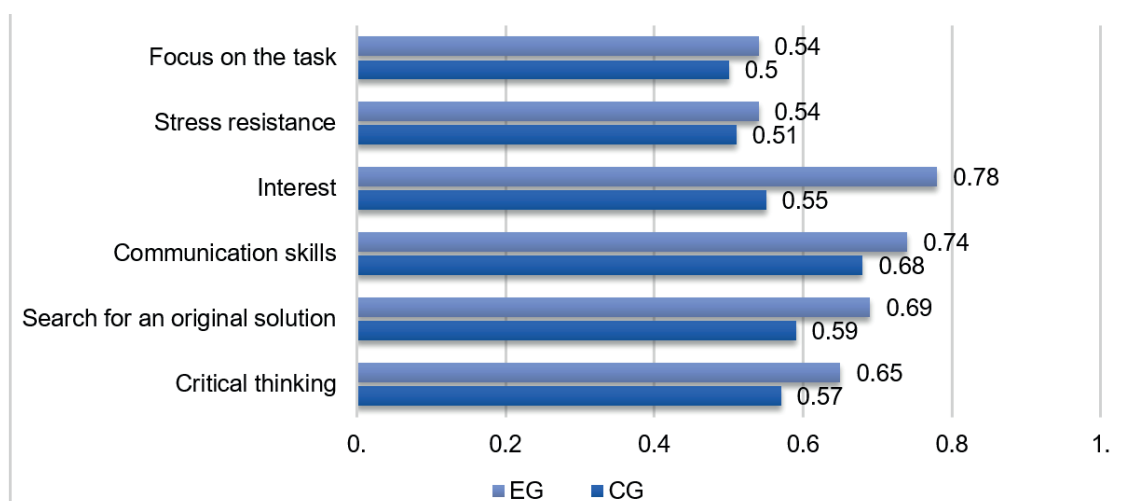


Figure 5. Monitoring students' skill levels (based on the learning coefficient)

The results of the experiment show that the use of a virtual learning environment in primary school has a number of advantages, as it engages the emotional sphere and sensory system, allows for the visualization of abstract and complex concepts, and stimulates the development of creativity and problem-oriented thinking. The results of the experiment demonstrate significant positive dynamics in the skills of EG students where immersive technologies were used, especially in terms of interest, critical thinking, and finding non-standard solutions.

At the same time, there are certain related challenges, shortcomings, and risks, in particular, the high cost of certified virtual tools and the complexity of access to the necessary technical equipment. Other risks include the development of excessive dependence on digital learning tools or health deterioration, including vision impairment and memory development processes. Given the innovative nature of the technologies under consideration, it seems necessary to identify potential risks and key opportunities for their adaptation to the educational environment (table 2).

Table 2. Advantages and risks of integrating innovative technologies into primary education	
Advantages	Risks
Variety of approaches, methods, and forms of presenting educational information	Slowing down of children's socialization due to the preference for interactive learning, deterioration of the quality of social interaction and sociability
Flexibility and adaptability	Possibility of reduced performance due to deviation from established software requirements
Optimization of students' psychological state, development of memory skills	Risks of increased competition between students during the game, possibility of excessive overload of children with information flows
Increasing student interest and motivation	Distracted attention and reduced ability to concentrate on individual tasks
Development of critical thinking	Risks of shifting the balance of the educational process in favor of interactive teaching aids
Development of emotional intelligence	Potential negative impact on students' health

It is necessary to focus on the key role of teachers in the process of introducing technologies. Teachers must be competent in the practical functionality of new tools and be able to effectively integrate their elements based on key pedagogical principles, primarily gradualism and balance. The combination of digital tools with traditional teaching methods will create a harmonious and effective educational environment. Teachers are also responsible for teaching students to use technology responsibly and developing their critical thinking and self-control skills. In general, motivation and reflection play an important role in the development of innovative education: motivation determines the learner's focus on active interaction and information activities, while reflection allows the learner to form the right attitude towards themselves, their own activities, and the world around them.

DISCUSSION

A critical analysis of the potential problems and advantages of integrating innovative educational technologies

into primary education requires a broader approach and updating to take into account contemporary challenges. Among the main advantages of using modern technologies in the primary school learning process are increased student motivation to learn, interest in results, an individual approach to each child, flexibility, adaptability, and interactivity in the presentation of educational material, as well as the development of digital skills. This is the conviction of Khayitov *et al.*⁽¹⁹⁾ and Washbrooke.⁽²⁰⁾ The researchers have implemented a number of experimental solutions for the integration of mixed reality tools, characterized by the use of tactile and sensory capabilities and reflection. The authors' position is consistent with the results of the current study.

Digital competence redefines teacher professionalism: the combination of traditional teaching methods in primary school with modern digital tools allows for the creation of an effective educational environment that promotes the comprehensive development of students. According to Leoste *et al.*⁽²¹⁾ the professional skills of modern primary school teachers require advanced digital competencies to engage tools and services that can diversify the learning process and increase its effectiveness. At the same time, as the results of the current study show, important skills include monitoring, analyzing, and evaluating learning outcomes, as well as stimulating students' interest and motivation.

Numerous examples of specific tools (mixed reality, gamification, online platforms) and their impact on diverse learners include the work of Bernacki *et al.*⁽²²⁾ and Sumardi *et al.*⁽²³⁾ who argue for the effectiveness of incorporating online platforms into the concept of inclusive learning strategies. This creates the conditions for the development of interactive tasks that take into account different types of information perception - visual, kinesthetic, and auditory, including in the format of gamification elements, video lessons, and audio materials.

In terms of their impact on cognitive and metacognitive outcomes, the technologies studied influence deeper learning processes such as critical thinking, problem solving, and memory. According to Rofii and Syarifah⁽²⁴⁾, the learning process should be comprehensive and assimilate logical-verbal abilities, cognitive activity, and the cognitive sphere. The qualitative result of the process should be the progressive development of students in educational and social-communicative areas. Hawkrigde⁽²⁵⁾ in his publications justifies the feasibility of developing early computer literacy in the process of mastering educational games, including *My Storybook* and *ZooBurst*. Such innovative tools significantly increase the interest of schoolchildren and allow them to gain practical skills in the use of theoretical knowledge, particularly in the study of natural sciences. The researcher argues that gamification develops critical and creative thinking, independent decision-making and teamwork skills, and optimizes communication processes.

Timotheou *et al.*⁽²⁶⁾ argue that it is important to provide practical support to children in the process of using innovations in the educational process, which is particularly effective in consolidating and systematizing learning material. Interactive methods and gamification develop information processing speed, attention, and memory, have an educational impact, and develop communication skills.

Among innovative technologies, teachers need to choose those that are most suitable for younger schoolchildren: virtual games, role-playing games, online platforms, and immersive environments. This is confirmed by Valverde-Berrocoso *et al.*⁽²⁷⁾ A qualitative effect can be achieved through simulation and role-playing, i.e., the reproduction of certain situations in a game format. Thus, the potential of games allows for the active participation of each student and increases their interest in the situation presented in the game.

At the same time, a number of problematic issues remain unresolved. Among the key gaps are the weak foundation for inclusive practices in primary schools and the low level of practical integration of innovative digital technologies. It is necessary to expand the pedagogical arsenal for the introduction of elements of virtual reality, digital platforms, and mobile learning, as well as to form a competence-based foundation for educators.

The limitations of the study include unclear boundaries of the topic (too narrow or too broad coverage), insufficient sources, and an uncritical attitude toward the material.

CONCLUSIONS

The integrated educational concept involves the use of various digital resources and tools and their adaptation to traditional teaching practices. Thanks to these, students master different levels of knowledge, and the main source of motivation for learning undergoes significant changes. The results of the experiment show that the use of a virtual learning environment in primary school has a number of advantages, as it engages the emotional sphere and sensory system, allows for the visualization of abstract and complex concepts, and stimulates the development of creativity and problem-oriented thinking.

The use of digital technologies in primary school has certain advantages and risks. Among the main advantages of using modern technologies in the primary school learning process are increased student motivation to learn, interest in results, an individual approach to each child, flexibility, adaptability, and interactivity in the presentation of learning material, and the development of digital skills. Among the key risks, it is necessary to highlight the likelihood of reduced attention and concentration, potential physical health problems, the development of psychological dependence on digital devices, and the deterioration of social interaction. In the

context of learning English in primary school, gamification and storytelling, which involve individual, partner, and group work, are considered effective technologies. Teachers play a key role in this process, as the skilful combination of traditional teaching methods in primary school with modern digital tools allows for the creation of an effective educational environment conducive to the comprehensive development of students.

Prospects for further research lie in the development of a practical strategy for the fragmentary digitalization of primary education that would best suit the specific characteristics of modern children and demonstrate high adaptability.

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ANNEX A**Questionnaire for collecting expert assessments of the level of development of primary school students' competencies***Application form*

Please answer the questions using a scale of 1 to 10, where 1 means not important/not a threat and 10 means very important/a threat.

1. How much does a person influence the occurrence of a forest fire?
2. Is it dangerous to smoke or throw unextinguished matches or cigarette butts in the forest?
3. How important is the influence of weather on the spread of fire?
4. Is it important to call for help immediately after a fire threat arises?
5. How high is the risk of using pyrotechnics and fireworks?
6. Is it important to extinguish small fires on your own?
7. How serious is the threat of using aerosols near open flames?
8. How important is it to cover your respiratory organs with a wet cloth?
9. How important is it to immediately leave the scene of the fire and call for help?
10. How important is it to monitor the scene after extinguishing a fire?
11. Assess the level of risk posed by playing with fire.
12. How important is it to call 101 and report the exact location of the fire?