Digitalisation and AI Tools in the Hands of Teachers

Challenges and opportunities for 21st Century Education

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Abstract

Digitalisation has become an important and increasingly indispensable component of education worldwide, including Slovakia. The labour market is undergoing transformations in this domain as well, creating conditions for the future workforce to engage with digital technologies and artificial intelligence tools. Its significance has been reflected not only in one aspect of the implementation of the new curriculum but also in the need to provide teacher education in this field. For example, positions such as School Digital Coordinators and Regional Teacher Support Centres have been established, with a thematic focus on digitalisation. Numerous other educational institutions and universities have also initiated various training programmes in this area, further demonstrating the significance of integrating innovations and digitalisation into schools. The aim of this paper is to present primary school teachers' perspectives on the use of digital technologies and artificial intelligence in education, to assess the extent of their utilisation, and highlight their importance in 21st-century education.

Keywords: Digital Technologies, Artificial Intelligence, Digitalisation

1 Digital World

The digital economy represents a concept that emphasises the penetration of information and communication technologies into production sectors and subsequently into the entire society, thus forming a digital society. The implementation of digitalisation in the economic sphere aims to strengthen the competitiveness of the economy, both at the micro level, i.e., the competitiveness of individual companies that introduce digital elements, and at the macro

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level, i.e., national or international competitiveness. Achieving comprehensive digitalisation of the economy will not be sufficient with only local initiatives of individual entrepreneurs; it will be necessary to coordinate and support this process at the national level (Veber et al., 2018, p. 13).

Governments of developed countries realise that digitalisation is a key phenomenon of the present and one of the fastest-growing segments of the economy. Although we are probably only at the beginning of the digitalisation era, it is clear that leaving this segment solely to market forces is not sufficient. A certain degree of intervention by state authorities is not only useful but also necessary, especially in the following areas:

- Cybersecurity and data protection, especially personal data,
- Facilitation of digital interactions, interoperability, and data portability (communication protocols),
- Integration of digitalisation into public administration (e-government),
- Adjustments to the legal framework (regulations and deregulations) resulting from digitalisation (including the shared economy, etc.),
- Changes in the content of education in the school system and in informal education (requalification, lifelong learning),
- Public support for projects focused on the digital economy and support for research (Veber et al., 2018, p. 22).

Digitalisation will likely significantly affect the labour market. Employment, its growth, and changes in its structure have always been influenced by the needs of employers, the development of the economic cycle, and various structural changes within the economy and individual sectors. In addition to these key factors, there are many others that affect the unemployment rate, such as demographic development, migration for work abroad, the level of the education and requalification system, and the generosity of the social network (Veber et al., 2018, p. 82).

Shapiro (2019, p. 15) in the publication titled New Childhood, translated in 2020, describes views on digitalisation from various perspectives. He states that among the many concerns of parents, teachers, and educators are worries that digital games damage eyesight, harm the brain, cause obesity, depression, and more. He also mentions many questions focused, for example, on whether the speed and ease of communication prevent children from being good conversational partners, or whether the development of critical thinking is hindered by simple and always available interactive stimulation, and others. The author's simple answer is – no.

1.2 Digital School

Despite the increasing and more effective use of information and communication technologies (ICT) by teachers, a significant proportion of educators still lack the necessary skills and confidence to integrate these tools into their teaching. Many of them gradually feel the need to develop their competencies in this area. Those who want to move from simple

texts and presentations to various interactive tools also show interest in education (Bobot et al., 2012, p. 4).

The authors further state that: 'Information technologies are constantly evolving. They are a common means of communication for students, as well as a tool for processing information. They are becoming established in families and public life. It is up to the teachers how effectively they can use this advantage' (Bobot et al., 2012, p. 23).

According to Burgerová (2003, p. 12), it should not be forgotten that education is the beginning of all transformations. One of the tasks of the school is to ensure access to information technologies and their use for all students. This includes professional training, acquiring general competencies in the field of information technologies, and improving communication skills, thus preparing the upcoming generation for ongoing changes. Ignoring global trends in education would further deepen the existing differences between countries. Information and communication technologies create an environment that simplifies various activities and transactions.

The state educational programme defines the general objectives of schools and the key competencies necessary for the balanced development of students' personalities. This matter is addressed by numerous prominent institutions, such as OECD, UNESCO, ISTE, ATC21, Partnership for 21st Century Skills, and others (e.g., UNESCO, 2011 or Binkley, 2010). These institutions often come up with their own views and classifications. For example, according to ISTE (International Society for Technology in Education, 2007), the following competencies are important for effective learning and a productive life of young people in a digital society:

1. Creativity and innovation: creating original works, expressing and testing hypotheses, for example, using models and simulations.
2. Communication and collaboration: the ability to work in teams, develop intercultural understanding, and present information in various ways according to the audience.
3. Research and information fluency: planning research, searching, organizing, and evaluating various sources and processing them for research purposes.
4. Critical thinking, problem-solving, and decision-making: responsibly identifying problems and questions related to task-solving, collecting necessary data, making qualified and ethical decisions, and analysing them.
5. Digital citizenship and lifelong learning commitment: a positive attitude towards technology in collaboration, creation, and learning, safe, legal, and ethical use of information and technologies, and personal responsibility for one's own learning.
6. Effective use of technology (Kalaš et al., 2013, p. 103).

1.2 Quality and Education

The only way to maintain the competitiveness of states in the current world and thus ensure the prosperity of citizens is through innovation and quality. The condition for ensuring permanent innovations of higher quality services and products is quality education (Turek,

2015, p. 46). Most experts, including politicians, sociologists, economists, and other science experts, agree that the future of humanity and the nations of all states depend on the quality of education, which also applies to the teaching process (Turek, 2015, p. 47).

The current trend in education is mobile learning, which uses mobile devices to carry out various interesting and interactive learning activities in different environments, such as nature, museums, or trips. This approach focuses on integrating modern technologies, which are close and attractive to young people, into the educational process. The informatization of education includes the incorporation of digital technologies into the educational process of children, pupils, and students, thus supporting their comprehensive development in all developmental areas. This process contributes to the development of skills needed for the 21st century and to achieving various educational goals (Kalaš et al., 2013, p. 29).

In connection with the development of computer networks, especially the internet and mobile technologies, one of the basic advantages is unlimited access to information, knowledge, or education. Studying and learning using online technologies is possible anywhere and anytime. This is related to the possibility of individualization and flexibility, as well as many other advantages for the student (Zounek et al., 2021, p. 236).

2 Education in the 21st Century

In connection with the ever-increasing need for knowledge in working with digital technologies and the influence of artificial intelligence, it can be said that these aspects need to be considered in the education of pupils and students. Many of them are already using or beginning to use and explore these digital tools.

This trend will become increasingly prominent, and the skills associated with their use will be required from future graduates in the labour market, for which they need to be prepared. This task also falls on the 'shoulders' of schools and teachers. Many schools today already have school digital coordinators, whose tasks include ensuring the flow of innovations related to digitalisation into the schools, as well as educating the teaching and professional staff in this area. However, a challenge may be the willingness to accept the importance of digital tools and artificial intelligence tools in education, as it often raises various questions about their appropriateness, caused by the abundance of information sources, diversity of views, and different generations looking at them. Just as there is a diversity of opinions, there is also a variation in the level of equipment in schools or the skills of teachers.

The aim of our research is therefore to present the views of schoolteachers on digital tools and artificial intelligence tools in the educational process of schools in the Nitra region and to indicate the extent of their knowledge, which is also reflected in their use in schools.

2.1 Research Objective and Methods Used

The main objective of the research was to determine the experiences of teaching and professional staff in schools related to the use of artificial intelligence tools in practice. A secondary objective was to ascertain their views on the opportunities that artificial intelligence tools bring to their practice, as well as to identify any concerns they have regarding their use in education. The research sample consisted of 106 participants from ten schools in the Nitra region of Slovakia.

Research methods used:

- Analysis and synthesis,
- Questionnaire method,
- Mathematical-statistical method,
- Deduction.

2.2 Research Questions and Hypotheses

Key Question:

- What are the experiences and opinions of teaching and professional staff in schools regarding the use of artificial intelligence tools in practice, and what opportunities and concerns do they identify?

Research Questions:

- What experiences do the research participants have with using digital tools and artificial intelligence tools in practice?
- What opportunities do artificial intelligence tools bring to teaching practice according to their opinions?
- What is the level of interest among research participants in using artificial intelligence tools?
- What concerns do the research participants have regarding the use of artificial intelligence tools in education?

Research Hypotheses:

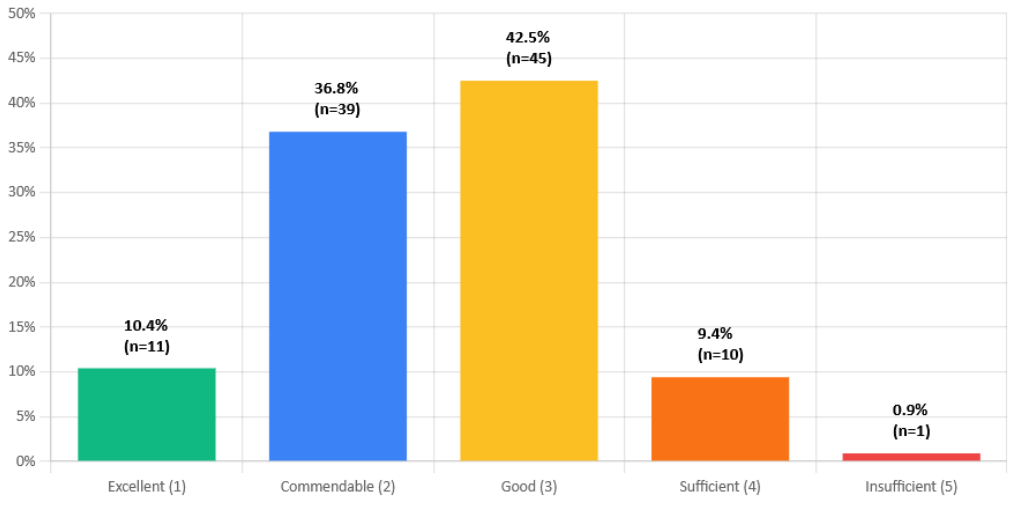
- H1: More than half (50%) of the research participants have experience using artificial intelligence tools.
- H2: The most of research participants can envision using digital tools and artificial intelligence in their work.
- H3: The greatest interest among research participants is associated with the use of artificial intelligence tools.
- H4: Less than half (50%) of the research participants have a negative opinion on the use of artificial intelligence tools.

Assumptions:

- We assume that at least 50% of the participants already have some experience with using artificial intelligence tools.
- We assume that the majority of research participants will perceive the opportunities brought by artificial intelligence tools positively for their practice.
- We assume that the greatest interest among research participants will be associated with the use of artificial intelligence tools.
- We assume that less than 50% of the research participants will have a negative opinion on the use of artificial intelligence tools.

3 Research Results

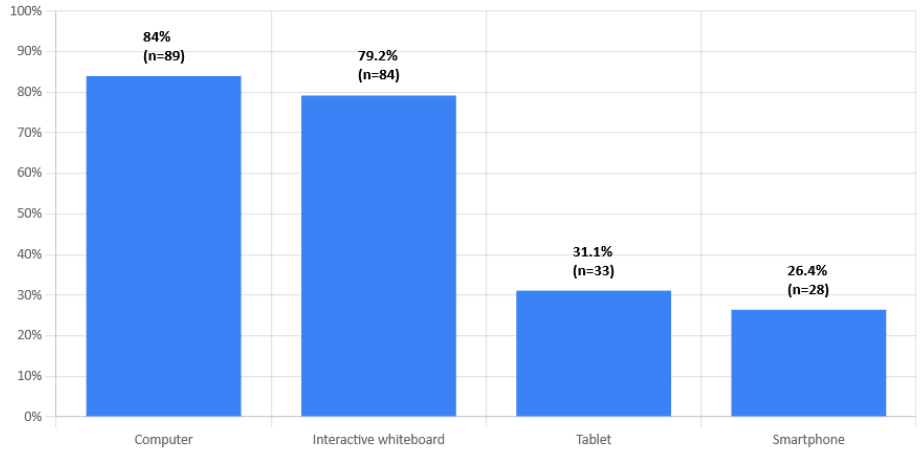
The first item of the online questionnaire aimed to determine the participants' level of skills in using digital technologies, where 42.5% of participants rated their skills at level three (good). The second largest group is 36.8% of participants who rated themselves with a grade of two (commendable). Almost the same number of participants rated themselves with a grade of excellent – 10.4% of participants, and a grade of four – sufficient, 9.4% of participants. Only one participant, i.e., 0.9%, rated themselves with a grade of five (insufficient).



Graph 1: How do you rate your level of skills in using digital technologies?

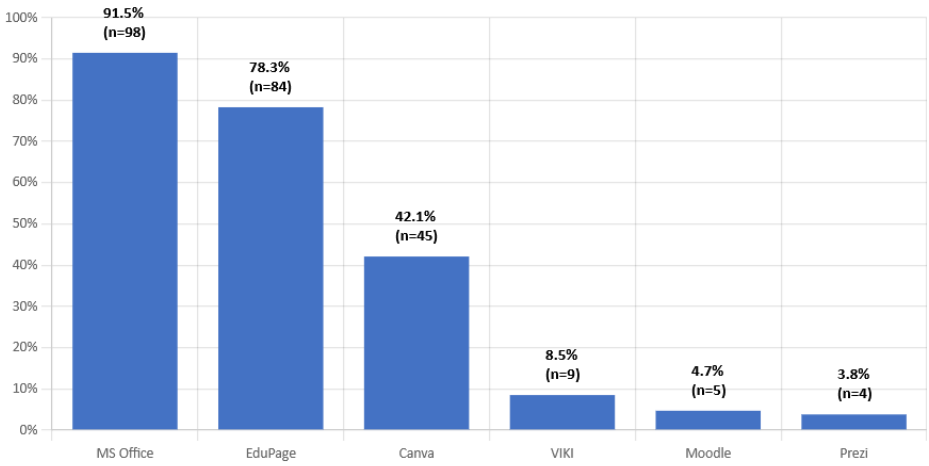
The aim of the following questionnaire item was to find out which digital devices participants commonly use in teaching. The two most used digital devices identified by the research participants were computers (84%) and interactive whiteboards (79.2%). Tablets were identified by 33 participants, representing 31.1% of participants. Smartphones were

the fourth digital device, identified by 26.4% of participants. Projectors, visualisers, interactive floors, and Lego robots each appeared once (0.9%) among the responses.



Graph 2: How do you rate your level of skills in using digital technologies?

For lesson preparation, participants most frequently use MS Office (PowerPoint, Word, Excel), with 97 responses, representing 91.5%. EduPage is used by 78.3% of the research participants, and the third most used platform is Canva (42.1%) and the information and educational platform VIKI, used by 8.5% of participants. Moodle is used by 4.7% of participants, and Prezi by 3.8%. Each of the following was mentioned once (0.9%): Wordwall, Mentimeter, Padlet, Learningapps, Zborovňa, Kahoot, YouTube, ChatGPT, websites, and the response 'I do not use any.' From these responses, it can be inferred that the most of participants use common tools and school applications. Less known and used are platforms and applications that are not commonly used or required in school practice.

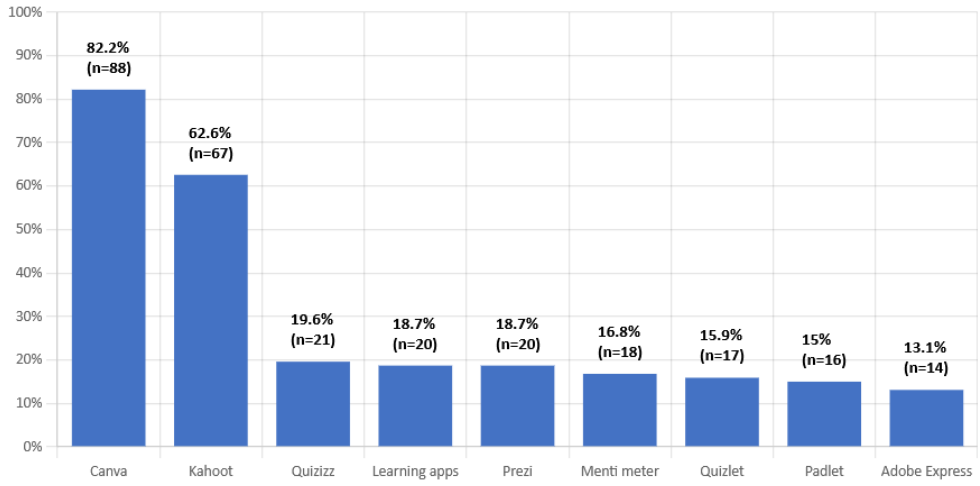


Graph 3: What digital applications or programmes do you use for lesson preparation?

The fourth item of the online questionnaire concerned whether participants were familiar with any of the listed digital tools. The most of research participants responded that they knew Canva (82.2%) and Kahoot for creating quizzes, with 67 participants, representing 62.6%. Twenty-one participants – 19.6% of responses – knew the Quizizz (now Wayground) platform. Similarly, 18.7% of participants identified the Learningapps platform and the Prezi programme. Mentimeter was known by 16.8% of participants.

A tool similar to Kahoot and Quizizz is Quizlet, known by 15.9% of participants. Padlet was known by 15% of participants and Adobe Express apps by 13.1%. Among the less known tools is the Actionbound platform, known by 2.8% of participants, and tools for creating simple websites for students. The most well-known of these is the Blogger application, known by four (3.7%) participants of the research sample, followed by G sites at 1.9% and Studenthosting at 0.9%.

The platform for creating animated videos, Videoscribe, was known by 6.5% of participants. Tools that were not identified include Plickers, Drilleo, Miro, and Figma, which are mainly used for assessment and collaboration.

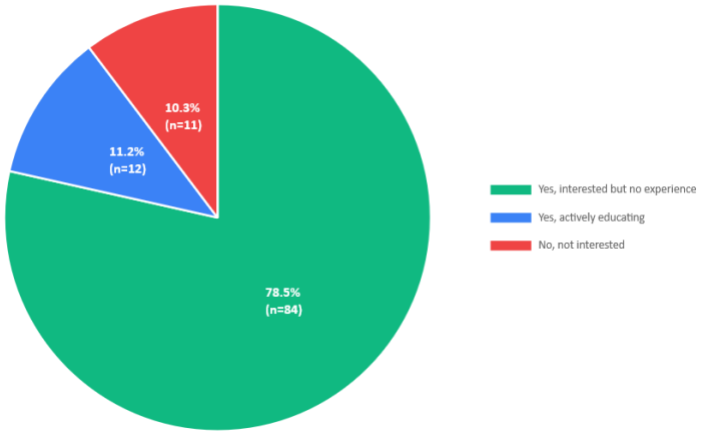


Graph 4: Are you familiar with any of the listed digital tools?

In the next questionnaire item, our goal was to determine the participants' interest in advanced technologies such as artificial intelligence, data analysis, or machine learning.

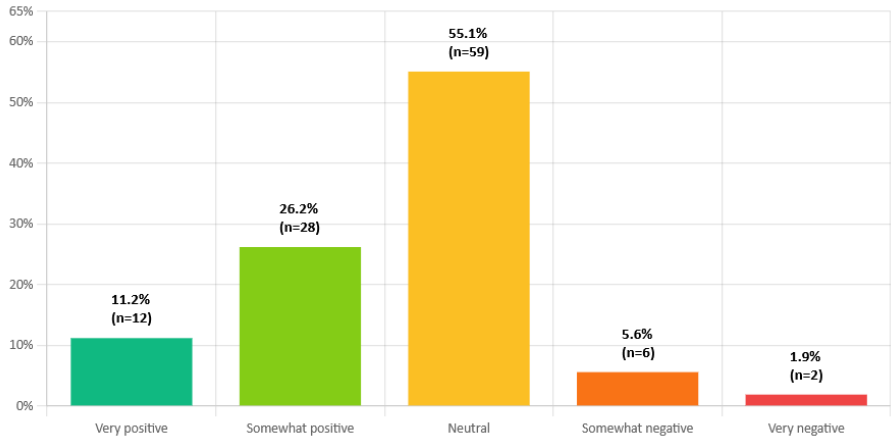
The most responses were recorded at the level of 'yes, I am interested, but I have no experience yet,' which was indicated by 78.5% of participants, representing 84 out of the total number of participants. Twelve participants, i.e., 11.2%, are actively educating themselves. However, 10.3% of participants are not interested.

Based on these results, it can be seen that the majority of teaching and professional staff in schools show interest in this area but do not yet have any experience.



Graph 5: Are you interested in advanced technologies such as artificial intelligence, machine learning, or data analysis?

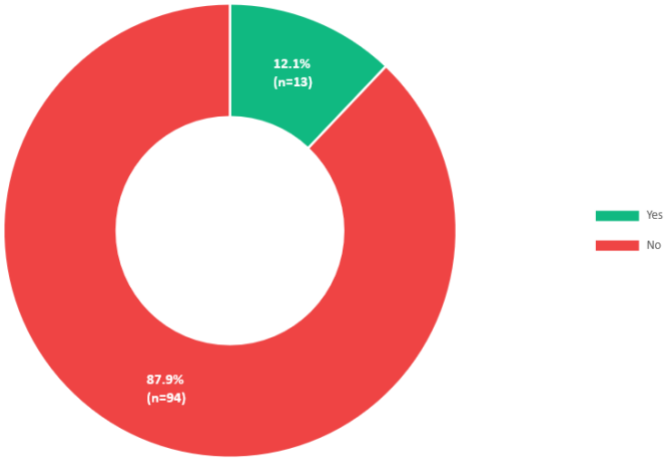
The aim of the next item in the online questionnaire was to determine opinions on the use of artificial intelligence tools in education. We consider this finding to be a significant source of information to motivate future use of artificial intelligence tools. The largest portion of research participants - 55.1% have a neutral opinion on the use of artificial intelligence tools in education. A somewhat positive opinion is held by 26.2% of participants. Twelve participants, or 11.2%, expressed a very positive opinion. A somewhat negative opinion is held by 5.6% of participants, and 1.9% have a very negative opinion. We consider these to be positive results, indicating that most participants are open to using artificial intelligence tools in education.



Graph 6: What is your current opinion on the use of artificial intelligence tools in education?

The seventh item we examined aimed to determine whether the research participants already have any experience using artificial intelligence tools in the educational process. To this question, 94 participants, or 87.9%, responded that they do not. Only 12.1% of them already have experience using these tools. This result may be caused by various aspects but suggests

the need for educating the research participants in working with these tools so that they can use digital tools and artificial intelligence tools in their practice and have sufficient knowledge about these tools, which are currently becoming known to young people and thus also to school students. This result is also related to the participants' responses and the results shown in graphic representation no. 5, where the majority of participants expressed that they have no experience in this area.



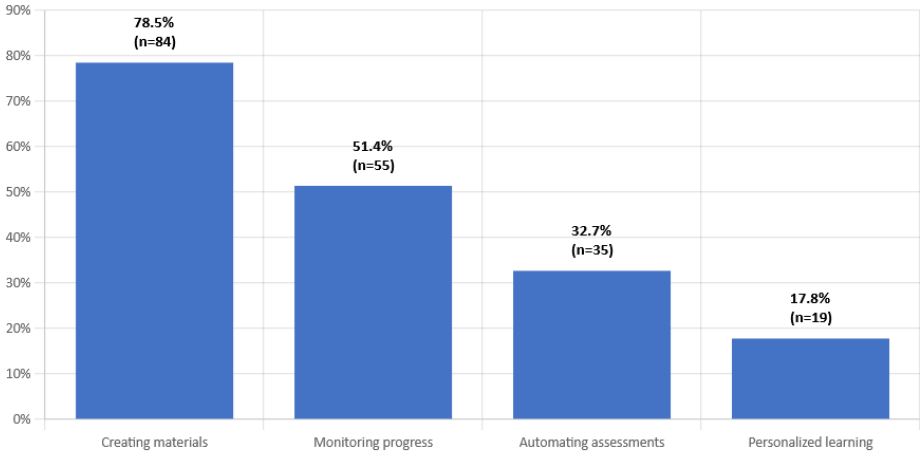
Graph 7: Do you have experience using artificial intelligence tools in education?

In an open-ended questionnaire item, we investigated which specific artificial intelligence tools participants use. Seven participants mentioned ChatGPT. The online graphic design tool Canva was mentioned three times. The following tools were each mentioned once: Padlet, D-ID, Copilot, Wocabee, and Google applications.

The aim of gathering additional data was to understand how participants think artificial intelligence could improve the teaching process or support them in their work. Participants had the option to select multiple possibilities where they believe artificial intelligence could be helpful. Creating teaching materials was selected by 78.5% of participants. The second most common response was monitoring student progress using artificial intelligence tools, mentioned by 51.4% of participants.

32.7% of participants believe that artificial intelligence could help with automating assessments, and 17.8% see the improvement of the teaching process in the possibility of personalized learning. One participant, representing 0.9%, mentioned using AI as a source of inspiration for teaching and other activities and facilitating lesson preparation. Another 0.9% of participants indicated that they do not know or see any way AI could help.

These results indicate that research participants perceive the potential for improving activities through the use of artificial intelligence tools in their practice.

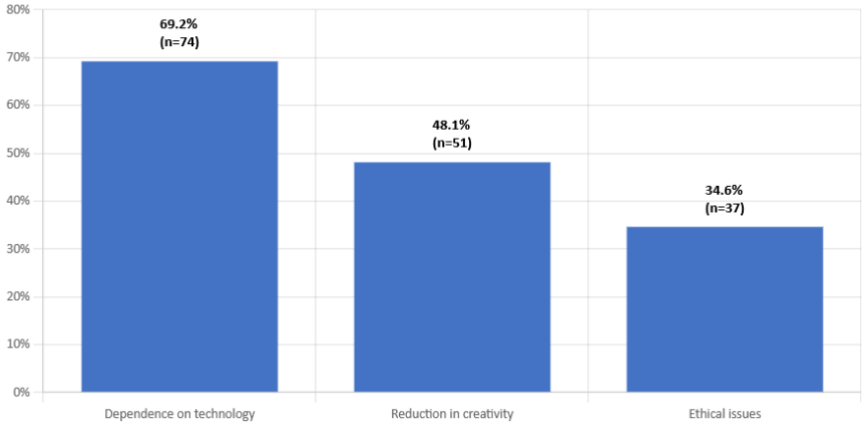


Graph 8: How do you think artificial intelligence could improve the teaching process or support you in your work?

What challenges or risks associated with the use of artificial intelligence tools in education do research participants see? Most participants consider the risk of students becoming dependent on technology, which was indicated by 69.2% of participants. A reduction in the creative elements of teaching is seen as a risk by 48.1% of them. Ethical issues were marked by 34.6% of responses.

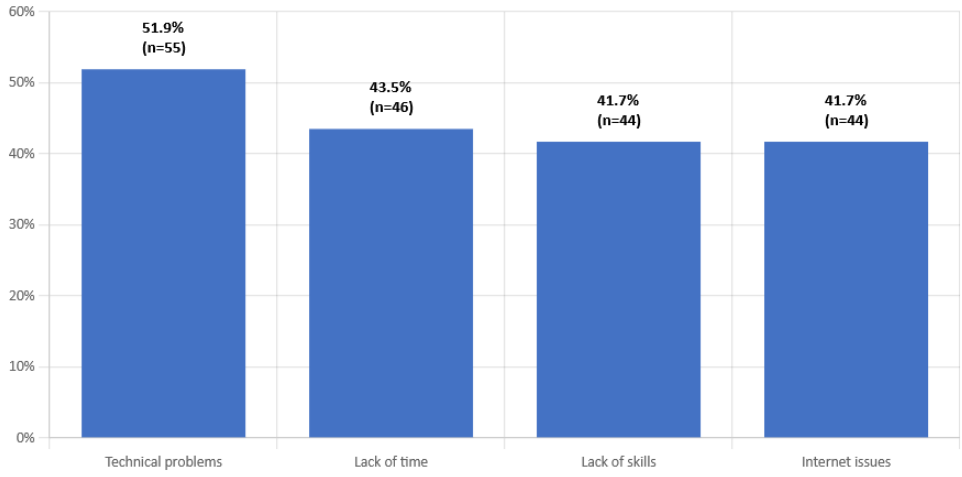
One percent of participants see the following challenges and risks: students will only play and experiment through trial and error, excessive reliance on the accuracy of results achieved using AI, loss of attention when using AI, critical approach to the results offered by AI, misuse and completion of assignments by artificial intelligence.

Awareness of the challenges and risks associated with the use of artificial intelligence in education is important for the proper handling of AI tools and preventing negative phenomena associated with it.



Graph 9: Do you see any challenges or risks associated with the use of artificial intelligence in education?

In the following item of the questionnaire, we asked our research participants about the challenges or problems they most frequently face when using digital technologies in teaching. More than half (51.9%) reported technical problems with devices. The second most common issue, according to 43.5% of participants, is the lack of time to prepare materials. An equal number, i.e., 41.7% of participants, expressed challenges or problems related to a lack of technical skills and internet connectivity.
The participants' responses reflect the situation in schools, where technical equipment often does not meet today's needs and these devices do not provide sufficient reliability in their use.



Graph 10: What challenges or problems do you most frequently face when using digital technologies in teaching?

One of the most significant findings is whether the research participants would like or can imagine using digital tools and artificial intelligence tools in their work. A very positive finding is that the largest portion of participants can imagine their use and would definitely like to use them, which is as high as 46.3%. Another positive result is the second most frequent answer – rather yes, which was indicated by 47 participants, representing 43.5% of responses.
6.5% of them are still unsure, and 3.7% of participants marked rather no. We did not record any responses in the definitely not option, which also contributes to the positive outcome of our findings.

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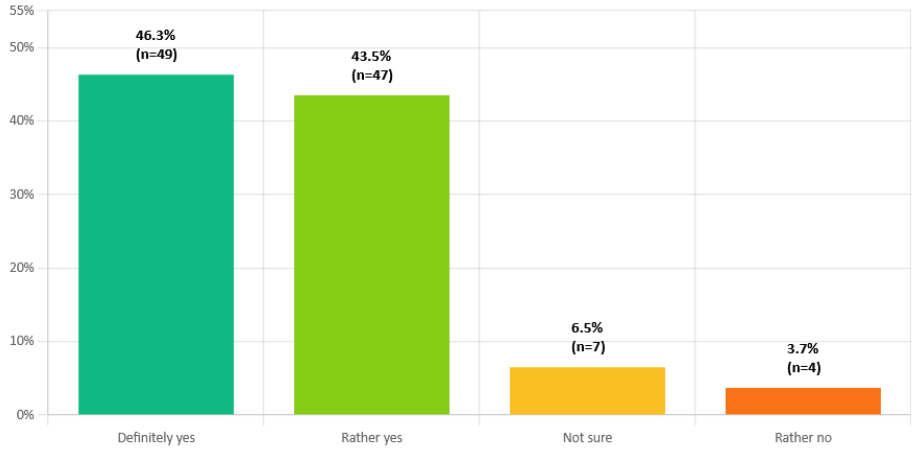
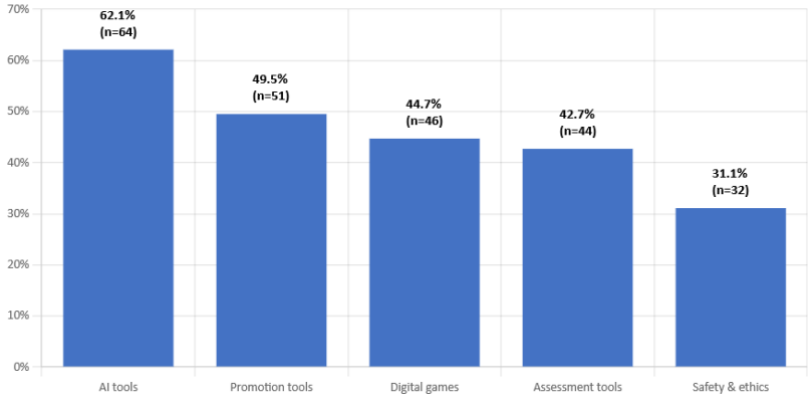


Graph 11: Would you like to use, or can you imagine using digital tools and artificial intelligence tools in your work?

In the last item of the questionnaire, we tried to find out from the participants which area they would like to better understand or learn to use if they want to use these tools. Participants had the option to select multiple choices. Artificial intelligence tools, including tools for generating images, design, presentations, text content, and conversations, tools for lesson planning, creating educational materials and worksheets, creating musical content, or improving a foreign language, were the most frequently selected response by the research participants, at 62.1%. Tools for promotion and presentation and creating simple websites, such as Canva, Prezi, Adobe Express applications, Webnode, and similar, were selected 51 times, which is 49.5%. Tools for creating simple digital games in education received 44.7% of the selections.

Digital tools for assessment, feedback, and creating quizzes were marked by 42.7% of respondents. In the area of safety and ethical behavior in the online space, 31.1% of participants expressed an interest in gaining knowledge and skills.



Graph 12: If yes, which area of digital tools or artificial intelligence tools would you like to better understand or learn to use?

4 Discussion and Conclusion

Based on the research conducted, it is possible to confirm three out of the four hypotheses we formulated, along with their associated assumptions. A pleasing finding for us is that 78.5% of the research participants are interested in advanced technologies such as data analysis, artificial intelligence, or machine learning, despite having no prior experience with them. We consider it positive that only 7.5% of the research participants have a view on the use of artificial intelligence tools that is worse than neutral. The first hypothesis was rejected because more than 50% of participants, specifically 87.9%, have no experience with using artificial intelligence tools. Among the opportunities that artificial intelligence presents for their work, participants most frequently perceive the possibility of easing their work in creating teaching materials or tracking student progress.

A good result is that only 0.9% of participants do not see any opportunities for simplifying work with artificial intelligence tools. The biggest concern among the research participants is the dependence on technology, which is a natural concern associated with the use of digital technologies by children and young people. The second hypothesis, which was confirmed based on the research results, is that the majority of research participants, specifically 89.8%, can imagine or would like to use digital tools and artificial intelligence tools in their work. This result indicates that the research participants recognize the importance and impact of technology on life today. Hypothesis No. 3: the greatest interest among research participants is associated with the use of artificial intelligence tools, can be confirmed. Among the offered areas of digital tools, participants most frequently indicated their interest in mastering and using artificial intelligence tools.

Digital technologies have become a part of people's lives. Therefore, it is necessary to discuss their impact and the opportunities they offer not only for a person's professional life but also for education. For schools to offer quality education, it is necessary to reflect on this area, which is increasingly coming to the forefront and is currently a highly discussed topic. Although artificial intelligence is not a new concept, its tools have recently become widely available to ordinary users, and this trend will continue. We believe that intensive education of schoolteachers and professional staff is very necessary for their proper use and implementation into the teaching process.

We concur with the authors' collective that digital literacy is, and will continue to be, an essential skill, forming part of the qualifications required for individuals seeking to succeed in the labour market and related domains. Therefore, in school education, even at the elementary level, subjects focused on mastering and using digital technologies will be essential. At the same time, a reasonable proportion of traditional teaching without digital tools should be maintained, and sufficient instruction should be provided to ensure mastery of the fundamental knowledge required for the standard operation and use of digital technologies (Veber et al., 2018, p. 97).

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