

# Exploring AI tools in education: Analyzing benefits, challenges, and student engagement

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**Abstract**— Artificial Intelligence (AI) tools are transforming education by enhancing learning, improving efficiency, and supporting educators. This paper explores AI-powered educational tools, analyzing their benefits, challenges, and impact on learning. Key applications, such as personalized learning platforms, intelligent tutoring systems, automated grading, and content generation, are evaluated for effectiveness and limitations. A survey of Information Technology students at the Faculty of Technical Sciences in Čačak shows a high level of familiarity and use of AI tools, with most students viewing them as beneficial. However, concerns about misinformation, over-reliance, and ethics highlight the need for responsible AI integration. The paper suggests strategies for incorporating AI into education, emphasizing transparency, ethics, and guidance. By ensuring a structured approach, AI can complement education without replacing critical thinking and problem-solving skills.

**Key words**— AI tools, education, critical thinking, artificial intelligence

## I. INTRODUCTION

The aim of this paper is to explore the role of Artificial Intelligence (AI) tools in education, highlighting their benefits, challenges, and potential impact on the learning process. AI-integrated tools are becoming increasingly relevant in modern education, assisting students and educators in various ways, including personalized learning, automated grading, intelligent tutoring systems, and content generation. In addition to analyzing the capabilities of these tools, this paper also includes a survey assessing the extent to which students are familiar with and actively use AI-powered educational technologies.

In recent years, AI has gained significant attention for its transformative potential across multiple industries, including education. AI-driven applications, such as adaptive learning platforms, virtual teaching assistants, and automated assessment

tools, are revolutionizing traditional educational methods. These tools enhance the efficiency of learning processes, providing students with personalized experiences while supporting educators in delivering high-quality instruction. However, despite these advantages, AI adoption in education also raises concerns, such as ethical considerations, data privacy issues, and over-reliance on automated systems.

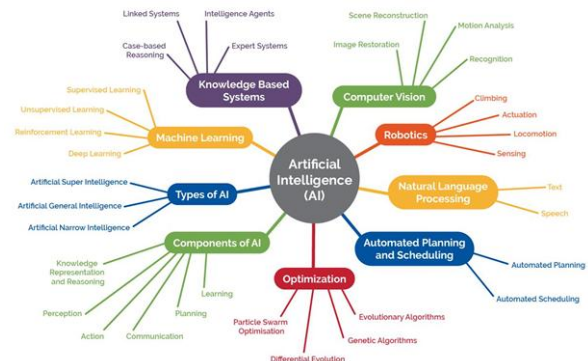


Fig.1. Components, types, and subfields of AI based on study [1]

Figure 1 provides an overview of the fundamental components, types, and subfields of Artificial Intelligence (AI) based on study [1]. It categorizes AI into key domains, including Machine Learning, Natural Language Processing, Computer Vision, and Expert Systems, illustrating their interconnections and applications. This classification highlights the diverse functionalities of AI and its relevance across various fields, including education.

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## II. RELATED WORK

Several studies have examined the influence of AI in education.

In study [2], the author presents that schools and teachers will have new products, benefits and also face drawbacks with the arrival of AI in education. The findings point out some suggestions for use of AI and prevention of possible problems. While participants generally seem to have positive perceptions towards AI, there are also certain drawbacks, especially highlighted by teachers and academicians, regarding the future of teaching.

Study [3] points out the importance of machine learning and its application in different areas. The paper also describes the ways machine learning has been applied to the education sector. Existing education-related platforms that use a machine learning component are also presented. Learning models based on machine learning can help identify individual student needs and sharpen the content delivered to every learner. This will improve student motivation and hence the overall results. Educators will also get a better understanding of each student's learning process, by taking real-time feedback.

Study [4] examines the attitudes of students towards artificial intelligence (AI)-based technologies, revealing that younger respondents are more enthusiastic about AI tools in education, with 39.8% actively using them, compared to 16.7% of university students. Despite the recognition of AI's potential, concerns remain, particularly regarding negative experiences and the fear of misuse, especially among university and high school students. While 63.4% express interest in learning AI tools, 24.87% do not prioritize this. The study underscores the need for educational institutions to address these concerns, integrate AI literacy into curricula, and create a supportive learning environment to improve students' competencies and educational outcomes. Future research should focus on promoting ethical AI use, ensuring that AI enhances education while preserving critical thinking, creativity, and independence.

The authors in study [5] explore the impact of artificial intelligence (AI) and student engagement on enhancing the effectiveness of distance education, particularly in the context of the shift to online learning triggered by the COVID-19 pandemic. With the rise of distance learning over the past decade, its effectiveness has been questioned due to the lack of direct interaction between instructors and students. The study involved 281 participants, all of whom used AI and had experienced at least one semester of online learning. Using SmartPLS v.4 for data analysis, the results show that both AI usage and student engagement significantly enhance the effectiveness of distance education. Furthermore, student engagement strengthens the impact of AI in improving educational outcomes, with statistically significant p-values. The findings emphasize the importance of combining AI technologies with active student engagement, offering valuable insights for educators and policymakers to optimize distance education strategies.

The research [6] examines the use of artificial intelligence (AI) by pre-service teachers in higher education (HE) and in their teaching roles at schools. While pre-service teachers acknowledge the potential benefits of AI in learning, the study reveals that the actual use of AI in HE is still limited, as is its

application in teaching roles at schools. Although pre-service teachers recognize AI's ability to foster a more inclusive classroom, especially for students with diverse learning needs, only a few integrate it into practice, with more than half admitting they have never used AI in their teaching. The research found no significant correlation between the use of AI tools in HE and their subsequent use in teaching, suggesting that students' exposure to AI during their studies does not significantly influence its use in their teaching careers. The study suggests that future research should focus on pre-service teachers' beliefs about AI in education, their development in utilizing AI in HE, and its application in schools, involving a larger and more diverse sample of pre-service teachers from various institutions. Additionally, further studies should explore the factors influencing how teachers apply AI knowledge and understanding in their professional activities.

The study [7] highlights the transformative potential of AI-powered educational tools in enhancing students' learning and understanding of complex concepts. The results show that AI technologies, such as adaptive tests, personalized learning experiences, and instant feedback, increase student engagement and motivation, leading to improved comprehension and academic performance. These technologies allow for the customization of content and support to meet the diverse needs of learners. Moreover, AI provides valuable data-driven insights for educators, enabling them to allocate resources more effectively, address knowledge gaps, and adjust teaching strategies. The study concludes that AI-driven learning aids significantly improve students' understanding and academic outcomes, offering personalized, engaging, and adaptive learning experiences. However, challenges such as data privacy, ethical concerns, and the need for teacher training must be addressed before these tools can be fully integrated into education systems. To maximize the benefits of AI-powered learning tools and shape future educational policies, continued collaboration among educators, AI experts, and policymakers is essential.

Given the rapid advancement of AI technologies, understanding their practical application in educational settings is crucial. This paper provides an overview of key AI tools currently used in education, detailing their functionalities and implications. To supplement this analysis, a survey was conducted to assess the level of student awareness and utilization of AI tools in academic settings.

## III. AI TOOLS IN EDUCATION

AI tools in education encompass a wide range of applications designed to enhance learning, teaching efficiency, and administrative tasks. Below are some of the most significant AI-powered tools, along with their benefits and challenges:

- **ChatGPT and AI Tutors:** AI-driven chatbots and virtual tutors provide instant academic assistance, answering student queries and offering explanations on various topics.
  - *Benefits:* Instant access to information, personalized responses, and round-the-clock availability.

- *Challenges:* Potential for misinformation, lack of human emotional understanding, and reliance on pre-existing data.
- **Adaptive Learning Platforms (e.g., Smart Sparrow, Knewton, Coursera AI):** These systems analyze student progress and tailor content to their individual needs, ensuring efficient learning paths and improved retention.
  - *Benefits:* Personalized learning, real-time feedback, and improved engagement.
  - *Challenges:* High implementation costs, data privacy concerns, and dependence on quality data inputs.
- **Grading and Assessment Tools (e.g., Gradescope, Turnitin AI):** Automating the grading process saves educators time and ensures consistency in evaluation, while plagiarism detection software helps maintain academic integrity.
  - *Benefits:* Increased grading efficiency, objective evaluations, and reduced administrative workload.
  - *Challenges:* Limited capability to assess subjective assignments, potential bias in AI grading models, and possible over-reliance on automation.
- **AI-Powered Content Creation (e.g., ScribeSense, Quillionz):** These tools assist educators in generating quizzes, summaries, and study guides, making content development more efficient.
  - *Benefits:* Faster content creation, accessibility improvements, and standardization of materials.
  - *Challenges:* Potential lack of originality, quality inconsistency, and need for human oversight.
- **Speech-to-Text and Accessibility Tools (e.g., Otter.ai, Microsoft's Immersive Reader):** AI improves accessibility by converting spoken lectures into text, aiding students with disabilities or those who prefer reading over listening.
  - *Benefits:* Greater inclusivity, enhanced comprehension, and assistance for non-native speakers.
  - *Challenges:* Accuracy issues in noisy environments, difficulties with technical terminology, and privacy concerns.
- **AI-Driven Research Assistance (e.g., Semantic Scholar, Elicit):** These platforms enhance academic research by summarizing papers, identifying key sources, and suggesting relevant literature.

- *Benefits:* Faster literature review, improved research efficiency, and better information synthesis.
- *Challenges:* Potential bias in search results, limited understanding of research context, and risk of misinformation.

By incorporating these AI tools into educational settings, institutions can enhance student engagement, streamline administrative processes, and provide tailored learning experiences that cater to diverse learning styles. However, educators and policymakers must carefully balance AI's advantages with its challenges to ensure its ethical and effective use in education.

#### IV. METHODOLOGY

To evaluate student awareness and adoption of AI tools in education, a survey was conducted among students of Information Technology at the Faculty of Technical Sciences in Čačak. The research was based on an anonymous survey designed to capture student attitudes and experiences with AI-integrated educational tools.

A sample of students (N = 63) participated in the survey. The data collection was performed using Google Forms, an online platform for designing and distributing questionnaires. The collected responses were analyzed using Microsoft Excel. The survey comprised seven questions, focusing on students' familiarity with AI tools, their frequency of use, and perceived benefits and concerns regarding AI in education. Table 1 provides an overview of the survey questions.

TABLE I. DISPLAY OF SURVEY QUESTIONS AND RESPONSES

No.	Question	Answers	Summary statistics (%)		
1.	Have you heard of any tools that incorporate artificial intelligence (e.g., ChatGPT)?	Yes/No	93.7%	6.3%	
2.	Have you ever used such a tool (e.g., ChatGPT) to solve school assignments or projects?	Yes/No	87.3%	12.7%	
3.	How often have you used these tools during your studies?	Never/Once/ Multiple times	9.5%	12.7%	77.8%
4.	Has this tool helped you clarify concepts or ideas that you didn't understand through traditional learning methods?	Yes/No	82.5%	17.5%	
5.	Would you recommend such a tool to other students as a useful learning aid?	Yes/No	88.9%	11.1%	
6.	Do you think it would be beneficial to implement a tool of this type in education?	Yes/No	81%	19%	

In addition to the survey, several AI tools were tested in real-world teaching environments to evaluate their effectiveness in practice. Professors and educators implemented AI-based

tutoring systems, automated grading tools, and adaptive learning platforms during lectures and coursework. Feedback from both students and instructors provided insights into the advantages and challenges of AI-assisted education. The results from these trials highlight the potential of AI tools to enhance teaching efficiency while also exposing limitations that must be addressed for broader adoption.

V. RESULTS

Based on the survey attended by 63 students of the Faculty of Technical Sciences in Čačak, the results can be seen below.

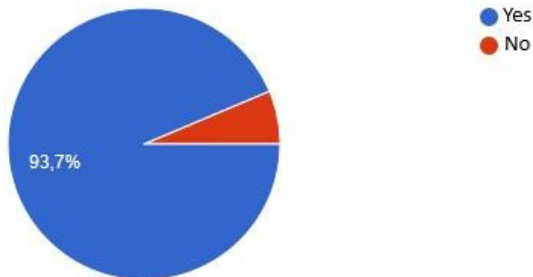


Fig. 2. Have you heard of any tools that incorporate artificial intelligence (e.g., ChatGPT)?

By analyzing the results from Figure 2, it can be concluded that 93.7% (59) of the respondents are familiar with some of the AI-integrated tools, while only 6.3% (4) are not.

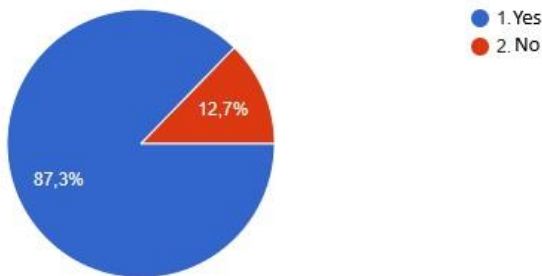


Fig. 3. Have you ever used such a tool (e.g., ChatGPT) to solve school assignments or projects?

By analyzing the results from Figure 3, it can be concluded that 87.3% (59) of the respondents use AI tools to solve homework assignments or projects, while only 12.7% (4) are not. From this, it can be seen that students largely solve tasks using these tools.

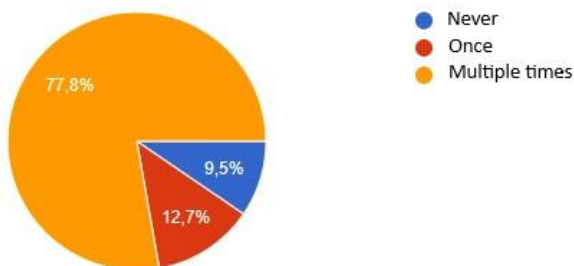


Fig. 4. How often have you used these tools during your studies?

By analyzing the results from Figure 4, it can be concluded that 77.8% (49) of the respondents have used these tools multiple times, 12.7% (8) have used them only once, while only 9.5% (6) have never used them. This is an indicator that students are already heavily relying on AI tools as a source of information in their learning during their studies.

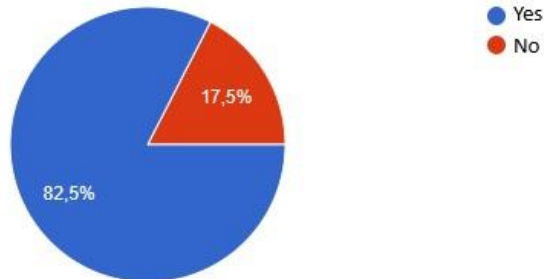


Fig. 5. Has this tool helped you clarify concepts or ideas that you didn't understand through traditional learning methods?

Based on what is shown in Figure 5, we conclude that 82.5% (52) of students confirmed that this method of learning has helped them more than traditional methods.

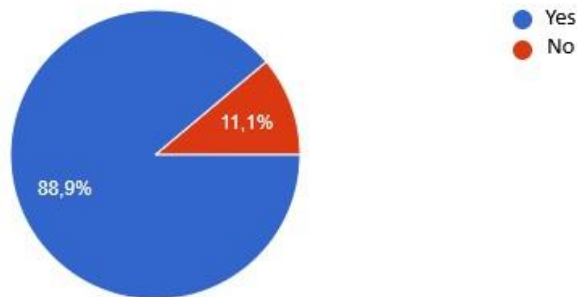


Fig. 6. Would you recommend such a tool to other students as a useful learning aid?

The majority of students recommend such tools to their peers, 88.9% of them, as shown in Figure 6, leading to an increasing number of students relying on these tools as their main source of information.

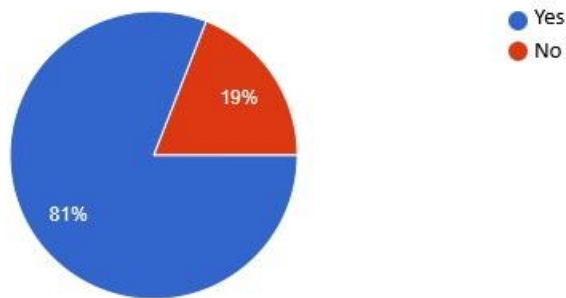


Fig. 7. Do you think it would be beneficial to implement a tool of this type in education?

From Figure 7, it can be concluded that 81% of students believe that it is useful to apply such tools for educational purposes, while 19% think it is not. Here, we already see that there are some students who use such tools but believe they should not be applied.

Using such tools could allow students to quickly generate answers or essays without the need for research. Additionally, the current models have been demonstrated to fabricate facts and provide inaccurate or biased answers to certain topics. It can also cause an over-reliance on technology, which might prevent students from developing critical thinking and problem-solving skills [8].

## VI. DISCUSSION

The main issues that arise from using these tools include the accuracy of information if students take this information as their primary or sole source, and obtaining results without any understanding of the process. Such tools certainly learn from mistakes over time and their accuracy increases, but it raises the question of how wise it is to rely solely on the results they provide. As mentioned, this might prevent students from developing critical thinking and problem-solving skills.

One solution is to create a specialized AI tool that is trained to provide basic information to students and instead of giving a final solution to all answers, it assists students in reaching solutions through their own thinking.

OpenAI offers organizations the opportunity to train chatbots with their own data and create a virtual assistant specifically tailored to their needs. This is also applicable in education, where schools could create their own virtual assistant with information covered in subjects so that students always have access to areas that have been addressed in class.

In the research titled "Open AI in Education: The Responsible and Ethical Use of ChatGPT Towards Lifelong Learning," the document analysis method was employed. It was found that for the use of ChatGPT in education, it is crucial to ensure privacy, fairness, non-discrimination, transparency in its utilization, as well as several other conditions outlined in the study [9].

Mohanad in his research states that ChatGPT is easily accessible to everyone and that universities should take a proactive rather than a reactive approach and adopt AI technologies in education. Universities should strive to revamp their perspectives on education. The introduction of ChatGPT in the education field has caused a drastic shift in the landscape. During the COVID-19 pandemic, universities developed new policies to respond to the change in the environment and set controls for using the new technologies for online learning and proctoring software for exams. Similarly, with this new disruptive technology (ChatGPT), universities should not prevent or ignore its use. Rather, regulate and utilize it [10].

This research supports the view that the integration of AI into education must be strategic and accompanied by institutional frameworks. The survey results, while not entirely unexpected, reinforce the idea that students are already deeply engaged with these technologies. The challenge lies not in encouraging use, but in directing it constructively. Formal guidelines, training modules for both students and faculty, and

incorporation of AI literacy into curricula are essential next steps.

Ultimately, the discussion around AI in education is not about whether these tools should be used, but how to ensure their use leads to meaningful, equitable, and responsible learning. Future research should investigate the long-term cognitive impacts of AI-assisted learning, explore cross-disciplinary differences in usage, and assess the effectiveness of institutional interventions aimed at guiding students in AI adoption.

## VII. CONCLUSION

The study demonstrated that students are highly familiar with AI-powered educational tools and actively use them for academic purposes. These tools significantly impact learning, offering efficiency and personalized support. However, their reliance also raises concerns about misinformation, over-dependence, and ethical implications.

To maximize the benefits while mitigating risks, institutions should integrate AI tools into education in a structured manner. Developing specialized AI systems tailored for academic use and ensuring transparency, accuracy, and ethical considerations will be crucial. Educators should guide students in utilizing AI responsibly, encouraging critical thinking rather than passive dependence. By doing so, AI tools can become a valuable supplement to traditional learning rather than a replacement.

Otherwise, the use of AI may be a curse rather than a blessing [11]. To ensure that these tools are used for educational purposes, it is necessary to teach them with accurate and verified information and to limit their application scope.

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