

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE LEARNING PROCESS

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Abstract

This paper explores the role of artificial intelligence (AI) in modern education, focusing on how it is used to support learning and how it affects the educational process. It discusses key benefits such as personalized learning, instant feedback, and improved accessibility, while also addressing potential drawbacks and ethical concerns, including privacy risks, overreliance on technology, and reduced critical thinking. The analysis includes practical examples and highlights the increasing use of AI by young learners. The findings suggest that, while AI offers significant opportunities for innovation in education, its use must be approached thoughtfully to ensure it enhances learning in a balanced and equitable way.

Keywords: artificial intelligence; learning; digital tools; youth; educational impact; ethical risks

1. Introduction

In recent years, artificial intelligence (AI) has gained increasing popularity due to rapid technological advancements and the wide range of domains in which it can be applied. Education is no exception. Both teachers and students are beginning to integrate AI tools into the learning process by taking advantage of the different innovative opportunities they offer. AI is reshaping the educational landscape by providing new ways to teach, learn, and engage with content-making it an increasingly attractive solution in the digital age.

This paper aims to explore what artificial intelligence represents in the context of education and how it is implemented through various platforms and tools. It investigates the benefits that AI brings to learning-such as personalized content, real-time feedback, and enhanced accessibility-as well as the challenges and ethical risks associated with overreliance on automated systems.

In addition, the study incorporates the perspectives of young learners by analyzing responses to a dedicated questionnaire, designed to understand how they currently use AI in their educational routines. This insight will help outline a balanced approach to future AI integration, identifying how it can be used effectively without diminishing critical thinking or human interaction.

2.AI in education

2.1 What is AI?

Artificial intelligence (AI) is a rapidly evolving field with wide-ranging applications across domains, including education. According to NASA (2023), **“artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence.”** These tasks include problem-solving, reasoning, decision-making, and adapting to new inputs-functions that are increasingly mirrored in modern educational tools.

In recent years, AI technologies have been progressively incorporated into educational platforms to enhance learning experiences. Tools leveraging AI can analyze student performance, adapt content dynamically, and provide personalized feedback, thereby supporting diverse learning styles and paces.

2.2 Duolingo

Duolingo stands out as a leading example of AI application in language learning, leveraging large language models (LLMs) to revolutionize the way lessons are created and delivered. Traditionally, language apps relied on static content, which limited learners' engagement and adaptability. However, with the integration of AI-powered LLMs, Duolingo can now generate realistic, contextually appropriate sentences and conversations on the fly, tailored specifically to the learner's proficiency and interests (Duolingo Blog, 2023).

This AI capability enables dynamic interaction that mimics real-life communication, offering personalized learning experiences that go beyond rote memorization. The models are trained on vast amounts of language data, allowing them to predict and generate natural language

responses, making lessons more interactive and meaningful. Furthermore, Duolingo uses AI to continuously analyze user input, identifying common mistakes and adapting exercises to target those weaknesses, which results in a highly personalized learning path.

Another important aspect of Duolingo's AI implementation is its ability to balance challenge and skill level, keeping learners motivated by presenting material that is neither too easy nor too difficult. This adaptive learning approach is crucial for maintaining learner engagement and improving retention rates. By integrating large language models, Duolingo exemplifies how AI can transform digital education from static content delivery to a dynamic, learner-centered process.

2.3. Grammarly

A critical component of Grammarly's AI system is its training on extensive corpora of text, which allows it to learn the nuances of language usage. By exposing the AI to both correct and incorrect examples of language, it develops the ability to identify errors and suggest appropriate corrections. This process is akin to teaching the AI through exposure to varied linguistic patterns, enhancing its capability to assist users effectively.

Furthermore, Grammarly's AI adapts to user interactions by incorporating feedback into its learning process. For instance, if users frequently dismiss a particular suggestion, the system recognizes this pattern and adjusts its algorithms accordingly. This dynamic learning approach ensures that Grammarly's recommendations remain relevant and user-centric.

In addition to grammar and style corrections, Grammarly's AI also assists users in achieving the desired tone in their writing. By analyzing context and language, the platform offers suggestions to align the text's tone with the intended audience or purpose, further demonstrating the versatility of AI in educational applications.

Overall, Grammarly exemplifies how AI can be harnessed to support and enhance the learning process, particularly in developing writing proficiency. Its adaptive, user-informed approach underscores the potential of AI-driven tools in personalized education.

1.4.ChatGPT

ChatGPT is an AI-powered conversational agent developed by OpenAI. It's based on the GPT (Generative Pre-trained Transformer) architecture, designed to generate human-like text based on

input prompts. ChatGPT can understand and produce text in a way that feels natural and interactive, making it useful for tasks like answering questions, writing essays, summarizing content, tutoring, coding, and more. It has been trained on a vast dataset containing a mix of licensed data, publicly available data, and data created by human trainers to develop an understanding of language, facts, and reasoning patterns.

ChatGPT is trained on a massive corpus of internet text, where it learns general language patterns, facts about the world, and how sentences typically flow. After pre-training, the model is fine-tuned with the help of human AI trainers who rank and review model outputs. This helps guide the model toward producing more helpful, safe, and aligned responses. Users interact with ChatGPT by typing prompts (questions, commands, etc.). The AI responds by predicting and generating text that continues the conversation logically and contextually.

3.Methodology

After analyzing the concept of artificial intelligence and the ways in which it can be applied in the learning process, it was necessary to explore, in practice, how it affects students and what their opinions are regarding AI. To this end, a questionnaire was developed, consisting of seven distinct categories of questions. These focused on the participants' demographic data, their familiarity with artificial intelligence, how they use AI, their views on the involvement of AI in education, comparisons between artificial intelligence and teachers, their attitudes toward the ethical issues posed by AI, and a section with optional questions. A total of 113 individuals participated in the survey.

4.Results

4.1. Data

In designing the questionnaire, the objective was to collect responses from a diverse range of students. Therefore, the analysis initially focused on several demographic variables:

- participants' age - with the majority (43.4%) being between 17 and 19 years old;
- gender - most respondents (59.3%) identified as female;
- level of education - the largest group consisted of high school students (48.7%), followed by university students (37.2%);

- field of study - with the highest representation from science/mathematics-informatics (34.5%) and human studies/philology (23%);
- area of residence - with 69% living in urban areas and 31% in rural areas;
- city of residence - with most participants coming from Iași, Bucharest, and Cluj-Napoca.

4.2. Familiarity with AI

The second category of the questionnaire aimed to assess participants' familiarity with the concept of artificial intelligence (AI) through a series of targeted questions. In response to the question "Have you heard of artificial intelligence (AI) before?", 100% of respondents answered affirmatively. When asked "How often do you hear or read about AI?", 65.5% reported doing so daily. Furthermore, to the question "Do you believe AI is already part of your daily life?", 56.6% responded "yes," while 31.1% answered "probably, but I'm not aware of it."

These responses suggest that although AI has only recently become a prominent part of society, its rapid rise in popularity and integration into everyday life has led to a relatively high level of awareness among young people. Notably, when asked "What is the first thing that comes to mind when you hear 'artificial intelligence'?", 83.2% responded with "ChatGPT/virtual assistants." This indicates that virtual assistants have become so prevalent among younger generations that tools like ChatGPT are the dominant mental association with AI-unlike older generations, who might associate AI more with robots or science fiction.

It is also important to note that young people's perceptions of AI are not uniformly positive. When asked "How would you describe your attitude toward AI?", 21.2% reported a very positive opinion, 33.6% leaned toward a positive view, 31.9% were neutral, 8.8% leaned toward a negative opinion, and 4.4% expressed a clearly negative attitude.

4.3. The use of AI

When asked "Have you ever used an AI-based tool?", 93.8% of young respondents answered affirmatively. In response to the multiple-choice question "Which AI applications have you used so far?", 93.8% indicated ChatGPT, 25.7% mentioned Grammarly, 82.3% reported using Google Translate, 62.8% had used Duolingo, and 79.6% cited social media platforms. These responses reinforce the findings from the previous section regarding high levels of familiarity with

AI tools among young people. However, the following questions began to focus more specifically on the role of AI in education.

Another multiple-response question - “For what purposes have you used AI?” - provided insight into how students employ artificial intelligence in academic contexts. A majority of respondents indicated they used AI for lesson explanations (68.1%), homework, essays, or projects (72.6%), grammar checks (38.1%), translation tasks (65.5%), and idea generation (62.8%). When asked specifically how they use AI in homework, 12.4% admitted to using it to complete entire assignments, 49.6% used it for generating ideas, 23.9% for verification or checking, and 14.2% reported not using AI for school tasks at all.

These findings suggest that young people are increasingly integrating AI into their academic routines to make learning easier and more efficient. However, the fact that a notable portion rely on AI to complete entire assignments or to generate content ideas raises concerns about potential overreliance. While these tools can enhance productivity, they may also contribute to a decline in students’ critical thinking and independent problem-solving skills. This marks the beginning of a pattern that may indicate misuse or overdependence on AI technologies in educational settings.

4.4. The involvement of AI in education

The next section focused on analyzing the perceived benefits of AI in the learning process from the perspective of students. When asked “Do you believe AI helps you learn more effectively?”, 26.5% of respondents answered “yes, very much,” 51.3% said “to some extent,” 13.3% “not really,” 7.1% “not at all,” and 1.8% selected “I don’t know.” In response to the question “On a scale from 1 to 5, how useful do you consider AI to be in education?”, 26.5% chose 5, 35.4% chose 4, 29.2% selected 3, 3.5% opted for 2, and 5.3% rated it 1.

Participants' reasoning was further explored in the multiple-choice question “What advantages do you think AI brings to education?” The most frequently cited benefits included: personalized explanations (77.9%), time-saving (63.7%), faster learning (43.4%), assistance with homework (46%), and constant availability (50.4%). Only 6.2% of respondents indicated that they did not see any advantages. Up to this point, students appear to hold a strongly positive view of AI tools and their potential to enhance the learning experience.

Given this generally favorable perception, it became essential to explore whether students also recognized potential drawbacks. In the multiple-response question “What risks or

disadvantages do you associate with AI in education?”, the most frequently cited concerns were: incorrect or inaccurate responses (71.7%), reduced personal effort (58.4%), overreliance on technology (54.9%), diminished critical thinking (75.2%), and ethical concerns (38.9%). Only 5.3% of respondents reported no perceived disadvantages. These findings suggest that despite their frequent use of AI tools, students remain aware of the associated risks and limitations.

Another key aspect explored was whether students believe AI could eventually replace a teacher. The responses were revealing: 7.1% believed that AI could fully replace a teacher, 38.1% saw AI as a potential assistant or partial replacement, while 54.9% rejected the idea entirely, affirming that teachers remain essential. These results are somewhat surprising, especially considering the overwhelmingly positive views expressed in earlier sections. One might have expected more respondents to view AI as a viable alternative to human instruction. However, it appears that young people still value the human presence as a critical component in the acquisition of knowledge and the educational experience overall.

4.5. Artificial intelligence and teachers

Given that young people expressed arguments in favor of both teachers and AI tools, the following questions aimed to directly compare the two in order to determine whether one is perceived as superior or whether a more balanced perspective prevails. In response to the question “Who helps you understand difficult concepts more effectively?”, 43.4% of participants selected teachers, while 36.3% chose both equally. When asked “Who provides clearer explanations, in your opinion?”, 45.1% answered “both,” and 34.5% selected teachers.

However, when presented with the question “Have you ever felt more understood by AI than by a teacher?”, 50.4% of respondents answered affirmatively. This result raises the possibility that, in the modern educational environment, students might not only gravitate toward virtual assistants for their convenience, but also due to a potential breakdown in the teacher-student relationship. Such a disconnect may lead students to feel less motivated to engage in class and more inclined to seek easier alternatives.

Regarding the question “Do you think teachers should encourage the use of AI in learning?”, 69% responded “yes, but within certain limits.” The conclusion that emerges from this section is that students generally recognize the value of AI in education but also understand the importance of moderation. At the same time, the increasing reliance on AI may be partially driven by weakened interpersonal connections in the classroom, suggesting that efforts to rebuild and

strengthen the teacher-student relationship could help prevent excessive or inappropriate use of AI tools.

4.6. Ethical issues posed by AI

It is also important to acknowledge that the use of artificial intelligence for completing homework, projects, or exams can be considered a form of academic dishonesty, raising significant ethical concerns. Among the 113 respondents, 45.1% admitted to having used virtual assistants during tests or examinations, 43.4% stated they had not, while 11.5% preferred not to answer. These figures suggest a notable prevalence of questionable academic practices involving AI.

Despite this, young people do appear to be aware of the ethical implications. When asked “How ethical do you consider it to use AI for assignments or evaluations?”, 57.5% responded with “sometimes,” indicating a nuanced view that recognizes the moral ambiguity of such actions depending on the context.

However, when it comes to implementing restrictions or regulations on the use of AI in education, the respondents were divided. Specifically, 38.9% believed measures should be taken in certain situations, 33.6% felt that clear actions should be implemented, 16.8% were against such measures, and 10.6% were undecided. These results reflect a generation that acknowledges the ethical challenges AI presents in education, yet remains conflicted about how, when, or even whether these issues should be formally addressed.

4.7. Optional questions

At the end of the questionnaire, several optional open-ended questions were included in order to gather more nuanced perspectives from the participants. These questions aimed to explore how young people felt they had been helped by AI, what concerns they had, what changes they would make to these tools, and what fears they associate with them.

As reflected in the previous sections, the responses were mixed. Some participants viewed AI as already being perfectly functional and helpful as it is. Others suggested improvements-most commonly, the need for more accurate and context-specific answers. A number of respondents also voiced concern about the potential impact of AI on young people's critical thinking skills, warning that increasing dependence on virtual assistants could hinder intellectual development.

5. Discussions and conclusions

Throughout this paper, we have explored the concept of artificial intelligence and the ways in which it has become increasingly integrated into various aspects of daily life. In the field of education, AI can serve as a valuable learning tool through applications such as Duolingo, Grammarly, and ChatGPT, whose functionalities were also briefly analyzed. Based on the results of the questionnaire, we gained insight into students' perceptions of AI and the ways in which they use it in their learning processes.

Several key observations emerged from this study. Young people are increasingly relying on AI tools-sometimes even to the extent of allowing them to complete entire tasks. This overreliance can lead to a decline in critical thinking skills and a weakening of independent thought. To address this issue, it is necessary to establish boundaries around the use of AI in education: boundaries that acknowledge its benefits without fostering dependency. AI can support learning, but its misuse or overuse may have long-term negative consequences.

Another important observation is that some students may turn to AI tools not only out of convenience but also because they no longer feel understood or supported by their teachers. Although respondents recognized the risks associated with AI and acknowledged that teachers are generally more effective in explaining complex concepts, many students still refrain from seeking help from educators. This suggests a growing disconnect in the student-teacher relationship.

Repairing this disconnect requires effort from both sides. Students must be encouraged to seek guidance from their teachers once again, while teachers should strive to be more approachable and open with their students, offering support when they struggle to grasp academic material. Only through collaboration can students and educators find the most effective and balanced way to use AI in education-one that enhances learning without compromising critical thinking.

Bibliography

<https://www.nasa.gov/what-is-artificial-intelligence/>

<https://blog.duolingo.com/large-language-model-duolingo-lessons/>

<https://www.grammarly.com/blog/product/how-grammarly-uses-ai/>

<https://openai.com/index/chatgpt/>

<https://help.openai.com/en/articles/6783457-what-is-chatgpt>

[Questionnaire results.xlsx](#)