Artificial Intelligence and it's Impact on Education

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Author note

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Abstract

Artificial intelligence (AI) has emerged as a transformative technology with significant potential to revolutionise various sectors, including education. This article provides a comprehensive review of the impact of AI on education, exploring its applications, benefits, challenges, and future prospects. The aim of this study was to identify AI's influence on the educational process and it's results. Another objective was to analyse people's opinions about Artificial Intelligence. An online questionary was conducted at the beginning of May 2023. The target group was represented by people who are young students who are still in education and could estimate the influence of Artificial intelligence on the educational process.

Introduction

Artificial intelligence (AI) has emerged as a powerful and transformative technology, revolutionising various aspects of our lives (Chen L., Chen P., Lin Z. , 2020). One domain where AI is making significant strides in education. The integration of AI in education holds the potential to reshape traditional teaching and learning methods, offering personalised, adaptive, and efficient educational experiences. From intelligent tutoring systems to virtual assistants and data analytics, AI is transforming the educational landscape, paving the way for a more engaging, inclusive, and effective learning environment.

This article aims to provide a comprehensive exploration of the impact of AI on education. We delve into the applications, benefits, challenges, and future prospects of AI in educational settings. By understanding the potential of AI and its implications for education, we can navigate the opportunities and challenges presented by this rapidly advancing technology.

AI offers various applications in education that cater to different stakeholders. For students, AI-powered intelligent tutoring systems can provide personalised instruction, adapting to individual learning styles, paces, and preferences. These systems analyse student data, identify knowledge gaps, and offer tailored feedback, ensuring optimal learning outcomes. Virtual assistants and chatbots equipped with natural language processing capabilities can assist students with queries, provide immediate feedback, and

support their learning journey outside the traditional classroom setting. (Guilherme A.,2017)

Thus, this article focuses on the effect of Artificial Intelligence and deals with the research's main question: "What are the potential benefits and drawbacks of AI in the educational area?". Also, the increasing popularity of Artificial Intelligence gives us more information, articles, texts, and experts in this area, making it easier to understand the pros and cons of AI. Therefore, this article aims to identify the motives for using AI in the education sphere and its role in it.

Literature Review

Artificial Intelligence (AI), has been developing rapidly over the past decade, and its applications have spread everywhere. AI is now used in various fields of life, including business, employment, science, and lower and higher education. But how has this artificial intelligence affected our lives, and how has it impacted our society?

During the 1950s, there was a burst of enthusiasm about whether artificial intelligence might surpass human intelligence. Since then, technology has changed society so dramatically that the focus of study has shifted toward society's ability to adapt to technological change. (Kile, 2013)

Popenici & Kerr (2017) defines Artificial Intelligence as computing systems that are able to engage in human-like processes such as learning, adapting, synthesising, self-correction and use of data for complex processing tasks. Has greatly impacted teaching and learning in both lower and higher education. Learning methods have been changing through the years, and artificial intelligence is becoming more and more a part of our system of education. Teachers and students are adapting to new technological ways of learning. So overall, AI has had a great impact on education.

Artificial intelligence goes hand in hand with the education system nowadays. AI in education, or AIED, has changed the way students learn and professors teach. But it is a topic of great interest in what way AI affects education and what has been it's impact. (Paek & Kim, 2021) examined the impact of AI on education by analysing AIED research topics and global trends published in the last 20 years. They found out that research papers related to AI and education have been increasing rapidly lately.

One form of AI that is being used by students more and more every day is ChatGPT. ChatGPT is an Artificial Intelligence-based chatbot capable of interacting and making it easier to do tasks (Shidiq, 2023). It basically gives answers to the questions given by the user. This helps students of various fields finish their assignments.

Shidiq (2023) has researched this topic and mentioned the results obtained by other researchers. His results showed that ChatGPT has an excellent power to advance

education in new ways. It is also capable of changing social interactions, and it has the potential to revolutionise the way of learning and teaching.

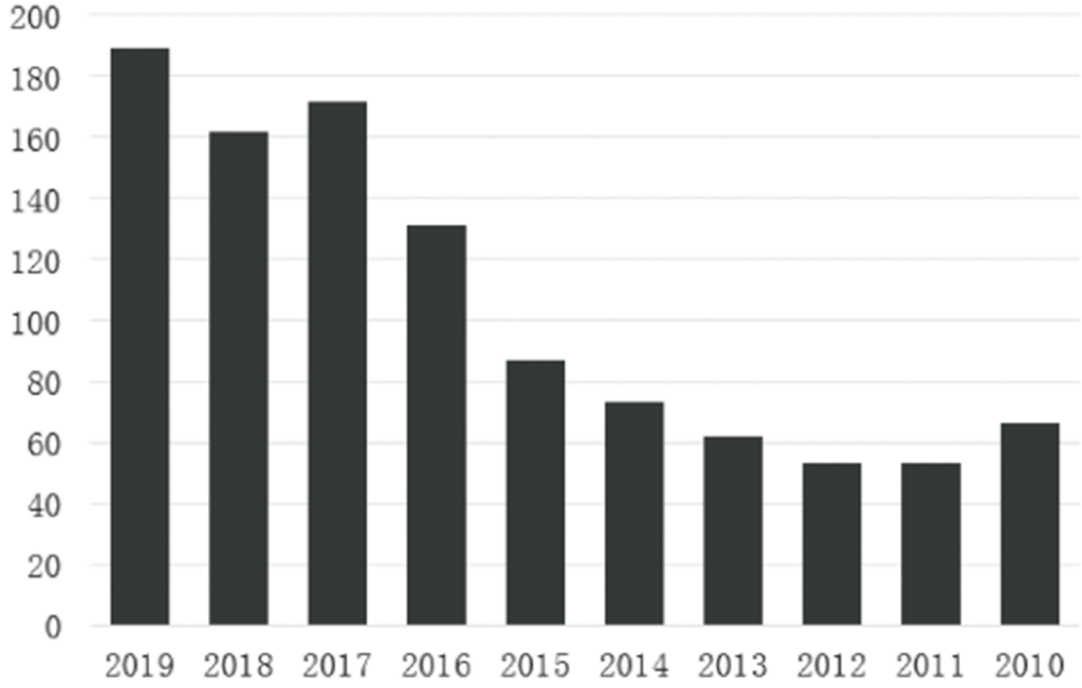
However, ChatGPT, even though it makes it easier for students to do their homework, it also makes them lack skills in problem-solving and critical thinking. Shidiq (2023) gives some weaknesses that chatGPT has. The first one is that learning requires direct interaction by the teacher or fellow students. The second one is that learning requires creativity, which is a feature that ChatGPT does not possess the same as humans. The third one is that students might have different ways of learning, and ChatGPT cannot capture all learning styles and ways of explaining. The fourth one is that relying too much on ChatGPT can make individuals weak in thinking critically so that when problems arise, they would not be able to solve them by themselves.

Artificial intelligence has been used on a massive scale since the first days of its launch. (Mariani et al., 2022) States that Chat GPT has launched on November 30, 2022, and it has been used by 1 million users in the first 5 days after it's launch. This just goes on to further show how to present ChatGPT is in people's lives nowadays. However, the article goes on to show that ChatGPT may not always be as correct as we think. But what could be some "imperfections" or faults of ChatGPT? The author had asked the platform to develop an essay on the relationships between "big data" and "innovation management". The text he received was weak in terms of logical flow, inaccurate in terms of factuality and truth, and not critical in terms of the elaboration of data. Given these results, we can understand that an article or essay generated by ChatGPT needs to be double-checked since it gives out inaccurate content (Kile, 2013).

This study is based on a review of existing literature and empirical data. The literature review will draw on academic journals, books, and reports from reputable sources. The empirical data will be collected through surveys and interviews with young people, students, and professors to gain insights into their experiences with Artificial Intelligence applications.

The implications of AI algorithms and systems in education are gaining increased interest year by year. Chart 1 shows the rising number of papers published on "AI" and "Education" from Web of Science and Google Scholar since 2010. Note that the papers published in 2015–2019 accounted for a large proportion, i.e., 70% of all the papers indexed. As education evolves, researchers try applying advanced AI techniques, i.e., deep learning and data mining, to deal with complex issues and customise teaching methods for individual students (Chen L., Chen P., Lin Z., 2020).

Figure 1. Papers in Web of Science and Google Scholar in the last ten years with keywords "AI" and "Education" (Chen L., Chen P., Lin Z., 2020).



This hegemonic trend focusing on the importance of technology for education has had a direct impact on teachers and teacher education because they are expected to combine students and their development of (1) "basic skills" and (2) "creativity and intellectual excellence within a globally technological and economically demanding society". However, "skills-based training, combined with ever-growing technologies, have overshadowed personal creativity, humour, imagination, intellectual excellence, dialogue, collaborative learning, compassion and spiritual sensitivity, which, in turn, has diminished our educational purpose". Teachers say. Thus, the tension between basic skills development and personal excellence has not been resolved successfully within the current educational context. However, it is not a matter of discussion education with or without technology because even a pencil and paper are technologies. They are so ubiquitous in our lives that we take them for granted and forget they are technologies, too (Guilherme, 2019).

AI–aided education includes intelligent education, innovative learning using virtual components, data analysis and predictions. The main scenarios of AI in education and key technologies that are supporting are listed in Chart 2. They are designed to improve learning value and efficiency by computing technologies, especially machine learning-related technologies. (Chen L., Chen P., Lin Z. , 2020)

Figure 2. Techniques for Scenarios of AI Education (Chen et al., 2020).

Scenarios of AI education	AI-related techniques
Assessment of students and schools	Adaptive learning method and personalized learning approach, academic analytics
Grading and evaluation of paper and exams	Image recognition, computer-vision, prediction system
Personalized intelligent teaching	Data mining or Bayesin knowledge interference, intelligent teaching systems, learning analytics
Smart school	Face recognition, speech recognition, virtual labs, A/R, V/R, hearing and sensing technologies
Online and mobile remote education	Edge computing, virtual personalized assistants, real-time analysis

According to the study used by Chen L., Chen P., and Lin Z. (2020), AI has been applied in educational institutions in different ways, including forms of automatisation of administrative processes and tasks, curriculum and content development, instruction, and students' learning processes. And the result of this study is that AI indeed improved the efficiency and effectiveness of administrative tasks, such as, for example, reviewing students' works, grading and providing feedback and explanations on assignments through automation using different platforms. Other areas in which AI has been applied in the education sector include curriculum and content development and instructions leveraging technologies such as virtual reality, web-based platforms, robotics, video conferencing, audiovisual files, and 3-D technology, which have made it possible for students to learn better. Teachers are more effective and efficient, and students have a personalised and richer learning or educational experience (Chen L., Chen P., Lin Z., 2020).

One form of this discussion is the negative implications of GPT Chat for students using this system to do assignments (Mariani et al., 2023), especially in doing assignments related to creative writing. Consequently, students avoid carrying out the steps and stages in making assignments the teacher gives. In creative writing theory, writing skills are not obtained naturally but passed through learning and practice. Creative writing is part of the results or products of creativity, which involve elements of skills. In its implementation, creative writing requires continuous guidance and process.

From the results and discussion, ChatGPT, with its ability to provide answers according to the keywords entered by the user, can positively influence the world of education and learning. However, it is also necessary to realise that not all of these facilities have a good impact on developing several student skills in learning, including creative writing skills. So it is necessary to do a strategy for teachers to use more than just internet-based learning, which students can misuse in doing assignments. One strategy that can be implemented is the use of paper as a medium as a form of process

control and assessment when compiling tasks related to creative writing, as stated by (Shidiq, 2023)

As AI solutions have the potential to structurally change university administrative services, the realm of teaching and learning in higher education presents a very different set of challenges. Artificial intelligence solutions relate to tasks that can be automated but cannot be yet envisaged as a solution for more complex tasks of higher learning. The difficulty of supercomputers to detect irony, sarcasm, and humour is marked by various attempts that are reduced to superficial solutions based on algorithms that can search factors such as the repetitive use of punctuation marks use of capital letters or key phrases. There is new hype about the possibilities of AI in education, but we have reasons to stay aware of the real limits of AI algorithmic solutions in complex endeavours of learning in higher education.

Methods

In order to answer the research questions, an online questionary was elaborated at the beginning of May 2023. The target group were people who were still studying and a few people who already graduated but could still estimate the influence of AI in the educational sphere. In total, 56 participants took part in the survey. According to the diagram, the age of 53 of them was 18-21, 2 of them 21-28, and only one was 28-34. The questionary started with identifying the Participant's age and studying degree. Therefore, participants answered some questions about AI influence on education, like "Have you ever used AI-powered instruments in your studying process?" and "In your opinion, does AI makes learning and teaching processes easier and more efficient?". After this, the survey continued with multiple-choice questions, such as "In your opinion, what are the benefits of using AI in the educational sphere?" and so on. In the end, a few questions focused on ChatGPT were asked.

Multiple-choice questions allowed us to see that using AI-powered technologies can be used more than in one direction, such as studying. It can also help with generating new ideas, helping with mental problems or even just for entertainment.

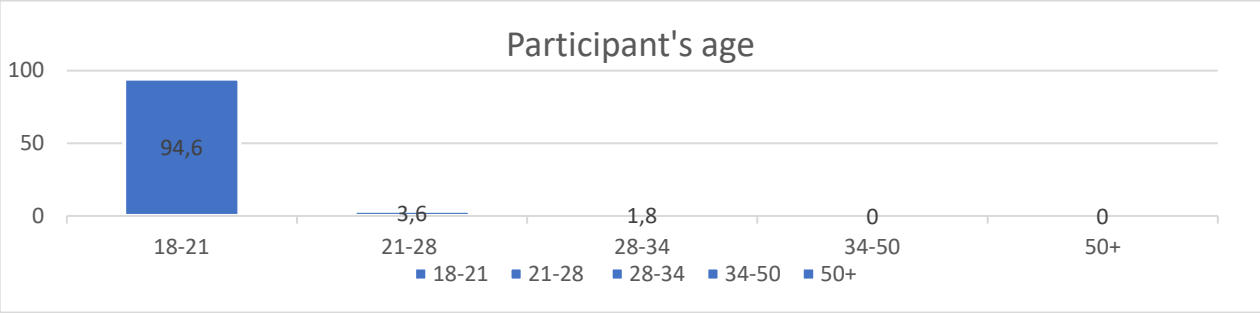
The last part of the survey was referred to the most popular AI-powered technology among students: ChatGPT. This is a versatile instrument that can be used in almost any sphere, and it can give you answers to almost any question.

Results

Socio-demographic characteristics of the sample

A significant majority of the participants (94.6%) fell within the age range of 18-21. This age group was deliberately selected due to the observation that young individuals tend to adopt and utilise AI technologies more frequently compared to older demographics, some of whom may not even be aware of such technologies. Consequently, individuals within this age bracket maintain a stronger connection to the learning process and are more actively engaged in educational pursuits. This focus on the 18-21 age group was intended to gather insights specifically from individuals who are currently involved in ongoing educational activities. (Figure 3)

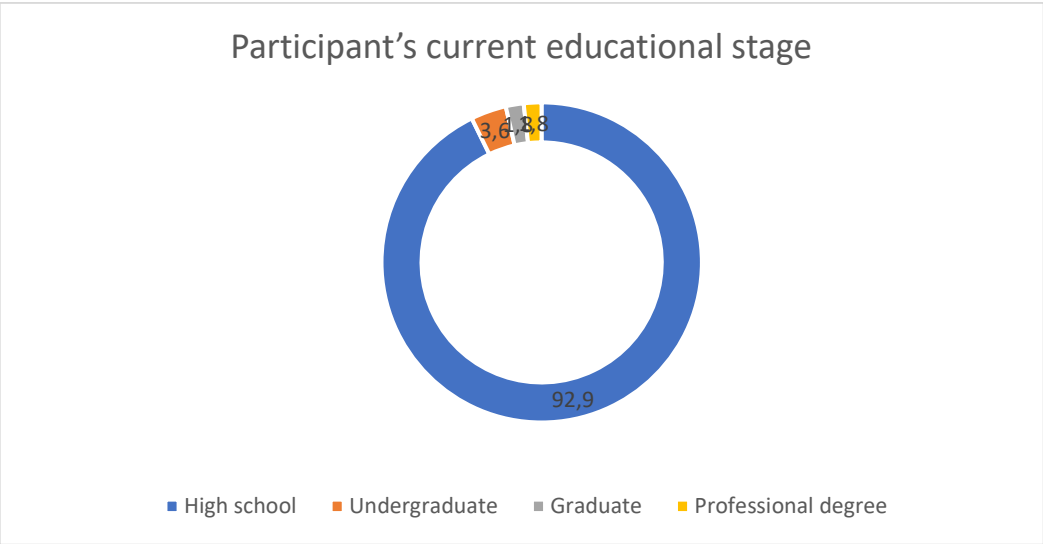
Figure 3, Age of survey's participants



Participant's current educational stage

The majority of respondents (92.9%) consisted of undergraduate students attending college or university. A small percentage of participants, specifically 3.6%, were high school students, while 1.8% represented graduates and another 1.8% held master's degrees. This deliberate choice to focus on the student demographic was intended to explore the impact of AI on the educational process from the perspective of those currently engaged in their studies. (Figure 4)

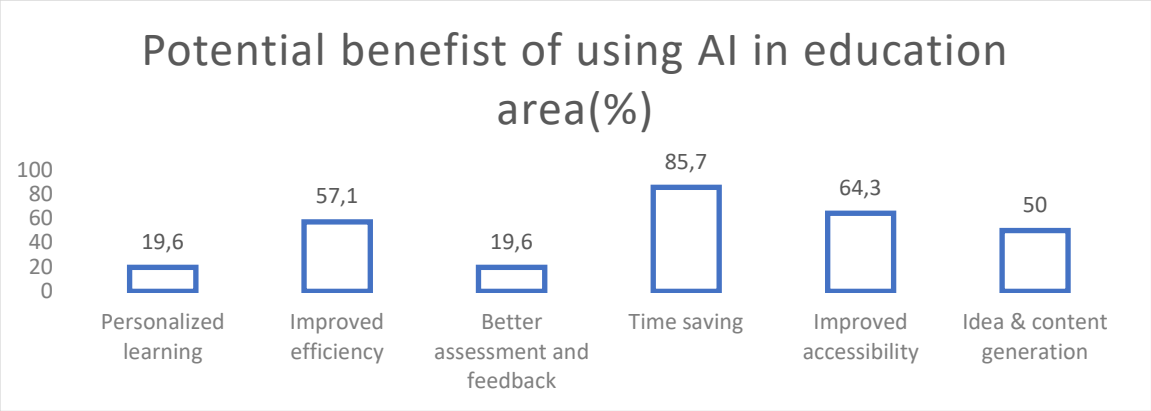
Figure 4, Participant's current educational stage



What are the potential benefits of using AI in education in responder's opinion?

The checkbox about the potential benefits of using AI in the education sphere revealed the following results (Figure 5)

Figure 5, Potential benefits of using AI in the education area

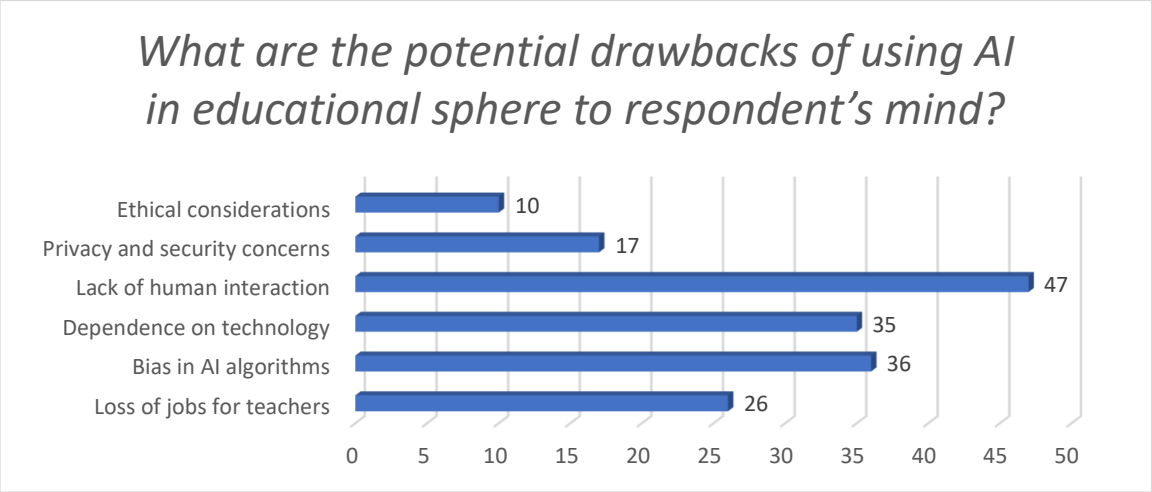


Based on the responses obtained, most of the respondents utilise AI-powered technologies primarily for time-saving. A slightly smaller portion of respondents reported using AI for improved accessibility and enhanced efficiency. Additionally, approximately half of the participants believed that AI is a valuable tool for generating content. Surprisingly, only 19.6% of the respondents indicated utilising AI for personalised learning. This lower figure may be attributed to the perception among participants that AI lacks the ability to provide accurate and reliable answers. Many participants emphasised that AI cannot be fully relied upon as a sole means of learning or performing tasks. Furthermore, a question regarding the potential replacement of teachers by AI in the future was also explored. The results indicated that 75% of the participants responded with "no," while the remaining 25% expressed a belief that AI could potentially replace teachers.

What are the potential drawbacks of using AI in educational sphere to respondent's mind?

The checkbox about the potential benefits of using AI in the education sphere revealed the following results (Figure 6).

Figure 6, Potential drawbacks of using AI in the education area

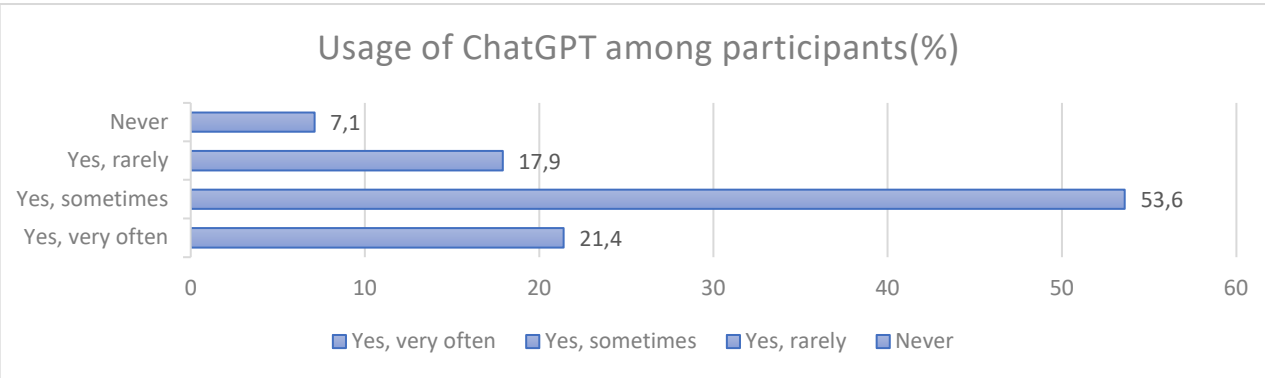


The analysis of the responses reveals that the majority of participants (47) perceive the main challenge with AI as its lack of human interaction. A slightly smaller group (36) identifies bias in AI algorithms as a significant problem. Dependence on technology is considered a concern by 35 participants. Interestingly, just over half of the respondents (26) believe that AI has the potential to replace teachers in the future. A smaller fraction of participants (10) acknowledges ethical considerations as one of the problems associated with AI.

Percentage of ChatGPT usage among respondents

According to our study, the findings indicate that 21.4% of respondents reported using ChatGPT very often. Most participants, specifically 53.6%, stated that they use it sometimes. Additionally, 17.9% of respondents reported using ChatGPT rarely, while a mere 7.1% claimed to have never used it before. (Figure 7)

Figure 7, Usage of ChatGPT among participants(%)

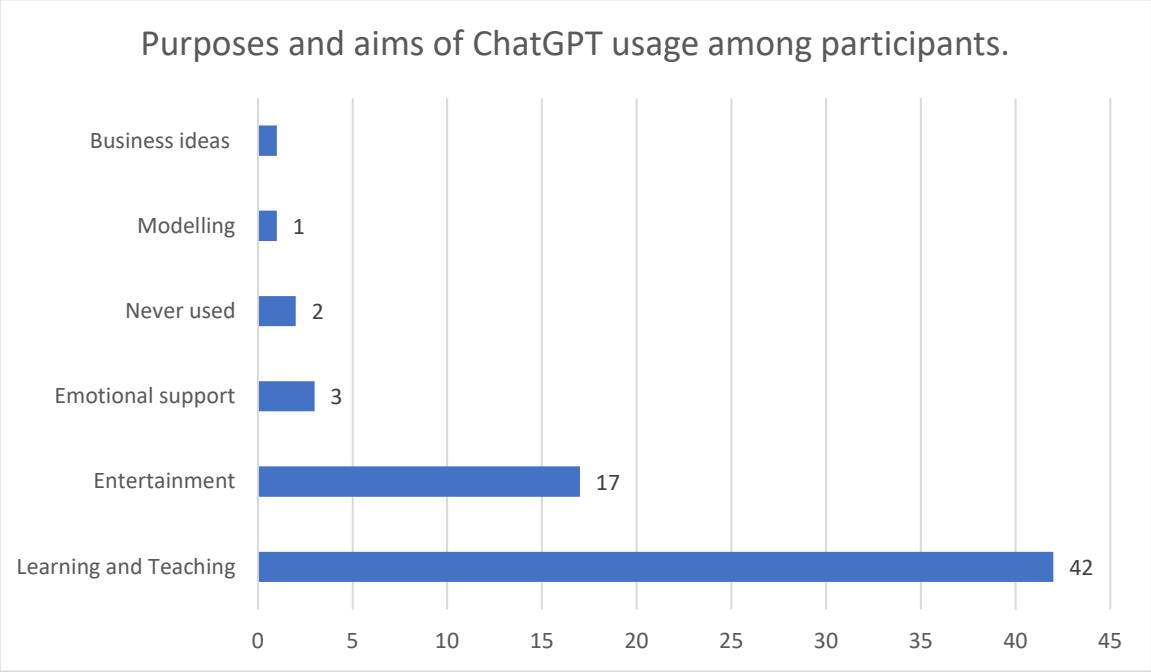


Purposes and aims of ChatGPT usage among participants.

The study findings indicate that a significant portion of respondents, specifically 75%, utilised ChatGPT for learning and teaching purposes. Additionally, 46.4% of

participants reported using ChatGPT as a content and idea generator. A smaller segment of respondents (30.4%) indicated using it as an entertaining tool. A small fraction of respondents, 3.6%, stated that they had never used ChatGPT before. Moreover, 1.8% of participants reported using ChatGPT for modeling purposes, while another 1.8% utilised it for generating business ideas. (Figure 8).

Figure 8, Purposes and aims of ChatGPT usage among participants.



What are the potential pros and cons of using ChatGPT by students and teachers?

The open-ended question concerning the potential advantages and disadvantages of employing ChatGPT for students and teachers resulted in diverse responses. Please find below a formal representation of the results in tabular form: (check the next page please)

Benefits	Drawbacks
Accessibility Quick access to information from various volumes Generation of various ideas in different interpretations Ability to create work and study plans Streamlining routine work and time-saving	Inaccuracies in the provided information Sometimes excessive simplification of learning, which, in my opinion, can lead to degradation Some people are not skilled in using it properly. As an advantage, time-saving is highlighted, while as a disadvantage, people sometimes don't even read what the chat provides them!
Time-saving.	People stop thinking independently.
Saves time and inspires new ideas. Due to this, people don't think, and human laziness grows.	Cannot name any.
The use of artificial intelligence in education mostly brings positive aspects and expands possibilities, but its excessive use can lead to the degradation of basic human skills and functions such as information retrieval.	Students take incorrect information.
Accessibility, efficiency, user-friendliness, clarity, quality.	This chat does not provide reliable information or may apply outdated regulatory documents in its responses. A student who constantly relies on it will face learning difficulties and be misinformed. This poses the risk that in the future, this person will mislead others.
Time-saving.	Excessive accessibility, and simplification of material search.
Accessibility.	Does not always provide correct answers.
Structuring ideas.	Possible errors in the algorithm increased laziness.
Easy access to information and its reliability.	Many.
Many.	It's all rubbish; AI will never replace humans.

Discussion

The findings of the study indicate that a significant majority of students view AI-powered technologies, including tools like ChatGPT, primarily as time-saving tools rather than as means to improve efficiency or accessibility. Furthermore, the study reveals that

a large proportion of the respondents primarily utilise ChatGPT-like tools for educational purposes. However, it is important to note that these tools have the potential to be utilised in various other ways beyond just learning applications.

Additionally, the survey findings indicate that a small percentage (7.1%) of respondents have never used ChatGPT. Among those who have used it, many expressed the opinion that ChatGPT makes the learning process easier. However, some respondents also mentioned concerns about the potential negative impact on creativity and an increase in laziness, aligning with the findings of a study conducted by Shidiq in 2023. This suggests that while ChatGPT-like tools offer benefits in learning, there may be trade-offs that need to be considered, such as the potential impact on creativity and motivation.

Conclusion

The purpose of the current study was to reveal the real benefits and drawbacks of AI in the education sphere and to examine how it affects people who are still learning by conducting an online survey. The survey results show that many people are not considering AI-powered technologies as well-studied tools for educational areas. Thus, many people suggest that its system has many biases and errors. On the other hand, many people mainly use it to save time or generate new ideas.

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