

## The Optimum Usage of Artificial Intelligence in the Education Sector: A Conceptual View

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### ARTICLE INFO

**Received:** July, 05, 2025

**Revised:** July, 13, 2025

**Accepted:** July, 20, 2025

#### Keywords:

artificial intelligence,  
higher education,  
education sector,  
qualitative research

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**ISSN:** 2548-0650

**DOI:** <https://doi.org/10.52876/jcs.1734468>

### ABSTRACT

The COVID-19 pandemic created a leap in the world's digital transformation. Digital transformation in the field of education has brought many new applications and the usage of artificial intelligence (AI) has also increased rapidly among the education sector. At this point, this study aims to explore positive and negative sides of the usage of artificial intelligence in the education sector. Also, the optimum usage of AI in the education system will be discussed in this study. This study employs a qualitative research methodology to explore the optimum usage of artificial intelligence in the education sector. The study includes open access and available data and publications to review and analyze the usage of AI in the education sector.

The study evaluated two sides of artificial intelligence in the education sector. When considering the advantages of AI usage in the education sector, it is determined that the future of the education sector will probably include much more smart technology tools and AI-based systems in the future. On the other side, the disadvantages of AI usage in the education sector warn policymakers to be careful in employing smart technologies and AI-based systems in the education sector.

### 1. INTRODUCTION

DIGITALIZATION and digital adaptation are key issues of the 21st century [1]. Digital adaptation has become mandatory by the COVID-19 pandemic [2,3]. World leaders have accelerated digital transformation largely on digital platforms for healthcare, education, utilities, and commercial purposes. The digitalization effect created by COVID-19 has provided countries with significant advantages in the fight against the global pandemic [4,5]. While working from home has become widespread as a new way of working, distance education and online education programs have increased in education.

Artificial intelligence education made its rapid entrance during the COVID-19 period. The emergence of distance education and digital education platforms has accelerated the digital transformation in education, and artificial intelligence-supported platforms have also found a rapid opportunity for themselves [6].

Artificial intelligence (AI), as the main source and driving force of smart technologies, is the technology that realizes the learning-comprehension-problem solving-decision making skills of computers and machines. AI-based smart technological tools and applications assist human activities today. The general benefits of AI can be summarized as follows [7]:

- Automation of routine work/tasks
- Faster processes and decision-making efficiency in data collection/analysis
- Minimization of human error
- 24/7 accessibility
- Physical risk/error reduction

The rise of digitization has allowed AI applications to enter various industries. Especially, the transition to distance education has revealed the necessity of AI applications in terms of sustainable education. At this point, it is an important issue to determine how beneficial the use of AI is in terms of education. Optimum use of AI will be key to sustainable education. Because most researchers argue that AI applications are beneficial in education, some researchers seem to state that excessive and uncontrolled use of AI will negatively affect education.

The artificial intelligence system is essentially a result of digital transformation and is open to development with machine learning. ChatGPT is now a part of students' learning processes. Students should be careful when using ChatGPT [8]. Artificial intelligence (AI) is increasingly being used in higher education. The number of AI applications is increasing in developed countries, especially in China [9]. Artificial intelligence can be considered an effective educational tool in terms of adapting learning materials. With personalized education, students can achieve more productive results in

their learning experiences [10]. Since the development of artificial intelligence technologies is still ongoing, their integration into the education sector and their use in education is also a developing process. Currently, the following applications for the use of AI in education are frequently seen in the education sector [11]:

- Artificial Intelligence-Supported Educational Game Applications: These applications can provide targeted learning for users.
- Adaptive Learning Platforms: Educational technology leaders such as Carnegie Learning and Knewton offer adaptable digital platforms for adaptive learning techniques.
- Automatic Grading and Feedback Systems; Management of processes such as grading and administrative work within learning and education with AI can enable educators to spend more time with students.
- Chatbot Applications for Student Support: Chatbots are a frequently preferred AI application in higher education.
- Smart Lesson Systems Applications: can create smart lesson systems in specific disciplines. (Such as mathematics and foreign languages...)

When the developments in the education sector are examined, it is seen that artificial intelligence-supported learning systems are on a rising trend. These digital education platforms provide content, assessment, and feedback opportunities tailored to students. Chatbots are also among the frequently integrated tools in the education sector [12].

The rapid progress of data-driven AI systems also requires rethinking the relationship between AI and humans. The joint development of AI and the human factor in the field of education can yield more successful results. When the development of AI is monitored, the fact that it provides data-driven results and is dependent on data necessitates the human factor for the system to work [13]. With the correct application of artificial intelligence, successful results can be achieved in service areas such as education. In this context, if algorithm errors, management problems, etc. negatively affect the operation of artificial intelligence, problematic results (such as racism, gender inequality) may arise [14]. From UNESCO's perspective, AI can offer a more personalized and engaging learning model. AI-supported management applications can be useful, especially in the monitoring and control stages of the education system. The use of AI applications for procedural purposes in the education sector can also improve future prediction and decision-making processes. For example, with AI, students' development can be monitored more efficiently, and future failures of students can be predicted. Or, for school-work relations, AI systems can provide some predictions for students' futures [15].

The data on the use of artificial intelligence in the education sector can be quite surprising. On a global scale, artificial intelligence could reach a size of \$6 billion by 2025. When child users are examined, approximately 44 percent are in contact with artificial intelligence. and it has been seen that children who use artificial intelligence use artificial intelligence for schoolwork. When teachers are examined, approximately 60 percent of them stated that they use artificial intelligence in teaching applications. More than half of the students in higher education are in contact with artificial intelligence [16].

Artificial intelligence provides many beneficial outputs to the education sector. However, the issue of what the roles of teachers and students will be in education is also important. In other words, artificial intelligence is successful in areas such as educational planning, creating educational materials, monitoring students, and measuring educational success.

Nevertheless, teachers have concerns about the future in terms of their profession, and it is not known what role e-learners will play in learning in the future as a result of students' contact with AI [17].

It is impossible to stay away from smart technology and artificial intelligence in the digitalized world of education. In addition to digital education, AI-supported education and learning tools and platforms have also been included in the education service. Now, the integration of artificial intelligence tools has a say in the new rising education market [18].

This study aims to examine the link between AI usage and education and focuses on the research question below:

- Is there an optimum level of AI usage in the educations sector?

## 2. STUDY STRUCTURE

This study keeps a qualitative research approach. As it is proposed, this study aims to explore the optimum usage of AI in the education sector. For explorative studies, qualitative research methodologies are more proper. The qualitative research method aims to explore new issues and examine details about new issues [3,19-21].

The study focuses on exploring the optimum usage of AI in the education sector. It is planned to compile publications and resources on the use of artificial intelligence in the education sector and to produce data on its optimum use. How artificial intelligence is used in the education sector, market development in the field of artificial intelligence and education, the negative effects of artificial intelligence on education, and the positive contributions of artificial intelligence to education will be examined.

## 3. EVALUATION OF AI USAGE IN EDUCATION SECTOR

According to records in 2021, the market size of AI in the global education industry was 1.82 billion US dollars. Both private and public sectors continue to invest in AI. Technological developments also support the demand for AI. The COVID-19 pandemic has increased the use of AI and digital technology for continuity in education [6]. As seen in Table 1, the value of AI in the global education market is expected to be 2.48 USD billion in 2022, with a growth of 36% expected towards 2032 [22].

TABLE I  
THE FUTURE OF AI IN THE EDUCATION INDUSTRY

2022	2.48
2023	3.37
2024	4.58
2025	6.23
2026	8.48
2027	11.53
2028	15.69
2029	21.34
2030	29.03
2031	39.48
2032	53.71

\*Source: Vision Research Reports (2023).

ChatGPT was made available for free in November 2022. It was introduced to people as a chatbot. Surprisingly, it reached 1 million users within 5 days of its launch. By December 2022, ChatGPT had reached 57 million users globally. Following ChatGPT's popularity, AI has also made inroads into different sectors [23]. In a study, 1000 US college students were asked about their use of ChatGPT. Approximately 60 percent of college students reported using ChatGPT for their homework. ChatGPT imitates human writing well and is used by students to cheat [24].

According to Burmagina (2025), the following can be said to be areas where ChatGPT is used in the education sector [23]:

- Support for homework: Students can get help from ChatGPT to complete their homework in an intellectual way.
- Support for writing: Writing assistance, such as drafting, template, and design preparation, can be received.
- Language Learning help: ChatGPT helps students in cases such as foreign language translation, grammar correction, etc.
- Tutoring: Opportunities such as lesson planning and personalized learning can be obtained.

However, it has not gone unnoticed that students, especially in the education sector, have shown more interest in ChatGPT than expected. A study conducted by Pew Research Center (2024) investigated the use of ChatGPT by Americans. According to the study, it was seen that 23 percent of US adults use ChatGPT. It was seen that 43 percent of people under the age of 30 use ChatGPT. In terms of education, it was seen that people with higher education use ChatGPT more. 37 percent of people with postgraduate and higher academic levels use ChatGPT [25].

The Digital Education Council conducted a survey in 2024 and examined the use of AI among undergraduate, graduate, and doctoral students. According to the responses of the students who participated in the survey (global, n=3839), ChatGPT (66%) is mostly used. After that, Grammarly and Microsoft Copilot programs are widely used [26].

As the use of AI in the education sector continues to increase, the examination of opportunities and threats has come to the fore. Scholars have begun to conduct research on the use of AI in education. For example, Beck, Stern, and Haugsjaa (1996) studied applications of AI in education, and they suggested that Intelligent Tutoring Systems were useful for education [27]. Chen, Chen, and Lin (2020) stated that AI applications are used extensively in education. Computer-based technologies used in education have been updated with AI applications. In the study, it was seen that the instructors controlled the student assignments more effectively and the quality of the teaching activities increased [28]. Borenstein and Howard (2021) examined the use of AI in education and emphasized the determination of ethical compliance [29]. Vargas-Murillo et al. (2023) studied on the usage of AI and ChatGPT in higher education. They suggested that educators should develop themselves in the field of digitalization in terms of the use of artificial intelligence and ChatGPT in the education sector. Educators can produce alternative solutions so that students do not misuse digital technology [8]. Sandu et al. (2023) stated that ChatGPT and other intelligent technological tools can yield beneficial results in higher education. They found that ChatGPT positively impacted outcomes such as student engagement and improved academic outcomes from a pedagogical perspective [30]. Anokhina (2025) emphasized that digital transformation and AI partnership in education are related. The use of digital educational resources has also integrated AI-supported technology and AI assistance into the system. AI is used by

both educators and e-learners in the education sector. Among the purposes of use of educators, benefits such as benefiting from AI assistance, saving time, and money are the focus. However, students' use of AI is seen as risky if not controlled in the long term [31].

It is seen that artificial intelligence is used in many interdisciplinary education. For example, there may be opportunities such as improving learning in medical education and improving patient care. Support can be obtained from artificial intelligence for improvement and development in health services. When using artificial intelligence in medical education, ethical factors should be taken into consideration [32]. The transition to student-centered platforms supported by artificial intelligence is also of vital importance for sustainable education. In the study of Kohli et al. (2024), they obtained data from students using artificial intelligence-supported education platforms through a survey and examined their reflections on service quality. As a result of the study, they determined that artificial intelligence-supported education systems positively affect service quality [33]. Abbas et al. (2024) investigated the use of ChatGPT on university students. It can be said that interesting findings were obtained in the study. For example, it was seen that workload and time pressure increased the use of ChatGPT. On the other hand, students who are sensitive to rewards are more distant to use ChatGPT [34]. When using ChatGPT, it should not be forgotten that it is a tool. ChatGPT and AI are very prominent technologies in the education sector. It can be said that AI and ethical issues should be addressed together against the negative effects that AI will create in the long term [35]. Crompton and Burke (2023) studied AI in higher education, and they used a systematic review. They found that language learning was the primary goal for the usage of AI in higher education. Also, the usage of AI seemed to be turned to China from the US [36]. Al-Zahrani and Alasmari (2024) stated that AI issue should be thought of based on three main dimensions, including ethical areas, technical areas, and social areas, to receive more positive outcomes of AI rather than negative outcomes [37].

Teachers and students may experience some problems because of the inappropriate use of AI applications. The use of AI in education on social and ethical issues can yield negative results. Engineers and trainers should decide together how artificial intelligence should be most effective in education. [17]. According to Moonpreneur (2023) AI gives advantages and disadvantages of the usage of AI into the education industry as Figure 1 [38]:

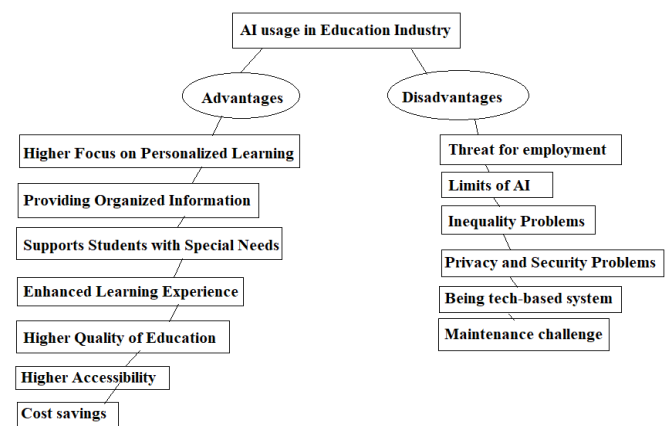


Fig. 1. Advantages and Disadvantages of the usage of AI in education



As a result of the use of artificial intelligence systems in the field of education, it can become easier to motivate students. Artificial intelligence systems are an effective tool in personalizing education. Students' strengths and weaknesses can be recorded and corrected by AI. One of the most important features of artificial intelligence is that it can transfer organized information to the user. Educational programs using artificial intelligence systems quickly transfer categorized information to the user. On the other hand, AI systems can offer effective education and learning programs for students with special needs (sight-impaired, hearing-impaired, etc.) who want to study. AI can play a key role in providing students with higher-quality education that meets international standards. Educational programs enriched with AI can provide students with realistic learning opportunities. Space and time constraints can be eliminated thanks to AI system training programs. In addition, it is among the main advantages that AI systems create significant savings in the education sector [38].

There is a possibility that artificial intelligence will cause a decrease in the workforce in the education sector in the future. Real teachers and individuals may have to withdraw from the education sector over time. AI systems are technology-based systems, and technological infrastructure is essential for continuity. Digital and technological systems, on the other hand, may not fully provide human emotional intelligence. In terms of human-oriented education, AI systems may pose a disadvantage in education. AI systems can lead to some inequalities. It can cause imbalances in education. Because AI systems record user and student data, it can cause some privacy issues. Updating and maintaining AI systems may involve some difficulties [38].

According to AFRIKTA Team (2023), AI usage in education can lead to main disadvantages as below [39]:

- Influencing students' creativity and innovation negatively,
- Influencing existing biases and focusing on a small area of issues or giving only one perspective for the related issues,
- Decrease human interaction and emotional learning,
- Increase tech-based learning models,
- Higher standardized learning systems can influence learning models negatively. Each student can have different characteristics in learning, but an AI system can ignore it.
- Higher AI usage can cause lower employment of real teachers.
- Cybersecurity problems,
- There will be less privacy with AI learning systems.
- The adaptation and set of AI-based learning systems or platforms can be expensive.

The rising digital transformation process also supports the use of AI in the field of education. This rise provides a conducive environment for the participation of AI systems in a way that will be beneficial in the fields of education and training. For example, AI systems for distance education have played an important role in the COVID-19 pandemic. However, judging well how AI systems should be used in education can eliminate the disadvantages of AI [40].

#### 4. CONCLUSIONS

The COVID-19 era created a beginning where humanity said hello to digital and smart technologies in an unexpected way. It can be said that digital and smart technologies are integrating with humanity faster than expected. Rapid integration with digital technologies has also enabled

individuals to accept the use of artificial intelligence more quickly. At this point, individuals and institutions may miss points when using artificial intelligence. Especially in sensitive areas such as education, it would be appropriate to use artificial intelligence and smart technologies with more precise planning and control.

Smart technologies and artificial intelligence systems seem to be more widely used in education in the future. However, it should be considered that artificial intelligence is still developing; there are many unknowns in the education sector in terms of artificial intelligence adaptation or transition to artificial intelligence. For example, we do not know how students and young people who are educated and trained by contact with artificial intelligence will experience a learning process in the long term. The benefits of artificial intelligence in terms of providing material and tool support to disabled students cannot be ignored. On the other hand, the incorrect and excessive use of some artificial intelligence applications, such as ChatGPT, by students may pose a threat to the education sector in the future. ChatGPT is estimated to have reached 100 million monthly active users in January 2023. This is considered an incredible record. Because even TikTok reached 100 million people in 9 months. While ChatGPT is mostly used in America and India, young and middle-aged people use ChatGPT intensively [41]. The increasing use of AI at the higher education level also necessitates taking some precautions. Rules such as strict homework checks for graduate students, plagiarism level measurement, and preventing excessive and abusive use of AI should be tightened. Applications such as student group work and educational applications that reduce AI dependency can also be adopted [42].

Potential risks and threats should not be ignored in the use of artificial intelligence in the field of education. It provides optimal use of AI for communities and communities to pursue their educational lives effectively [43]. In fact, excessive use of technology or AI can prevent effective learning. Students may be deprived of expansion because they take a single perspective and an overly standardized curriculum. AI's lack of emotional intelligence reduces emotional interaction and negatively impacts learning. Therefore, it is necessary to ensure the continuity of training together. It is important that AI is a helpful tool, but the main tool negative aspect is that it will reveal risks in people's education [44-47]. Since developing technologies such as artificial intelligence have not yet reached a standstill, their long-term effects are still uncertain [48]. To reduce negative effects, practices such as educating the public, warning them, informing them about malicious uses, and restricting them may be useful [49].

Based on the findings of the current study, it is recommended that AI-based education and learning programs should be carefully planned and that there should be a monitoring mechanism for students' use of AI. Using AI in education without control and supervision may have negative consequences for both educators and students. This study points out the optimum usage of AI in the education sector. It is thought to contribute to policymakers, scholars, teachers and students as showing two sides of AI in the education sector.

This study has some limitations based on its research methodology and data. Future studies can find new findings when they review different sources or employ different research approaches.

## ACKNOWLEDGMENT

This study is derived from a paper titled “A Mini Review on AI Usage and the Education Sector”, presented at the 3<sup>rd</sup> International Marketing Symposium 2024.

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