



# Artificial Intelligence in Education (AIED): Implications and Challenges

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**Abstract.** Artificial intelligence (AI) is having an impact on every aspect of contemporary life. Artificial intelligence (AI) is being increasingly widely used in an effort to imitate human cognitive abilities via applications that make people's lives simpler and more efficient. Artificial intelligence is also being used in the education industry to enhance the learning and teaching processes. People can employ AI systems to help them learn. The growing usage of artificial intelligence is reshaping the educational environment. This article offers a thorough assessment of chosen materials on artificial intelligence in education (AIED) released lately (mainly from 2018-2022), as gathered in the Web of Sciences database and selected AIED-specialized publications, from distinct educational viewpoints. A total of 60 papers and industry expert resources were extensively assessed after meeting all selection criteria. This article discusses the potential use of AI in education, reviews their proven and potential educational benefits, bridges the gap between AI technological innovations and their educational applications, and generates practical examples and inspiration for both technological experts who create AIED technologies and educators who lead AI innovations in education. Maintaining a balance between AIED's potential advantages and increasing ethical and privacy issues, the article highlights the issues and policy implications that should be included in global and local discussions on the benefits and hazards of incorporating AI into education and preparing students for an AI-powered society. .

**Keywords:** AIED, AI, EDTech, artificial intelligence, big data, personalized learning, collaborative learning

## 1 Introduction

As Henry Ford highlighted in this instance, innovation does not imply that society should just work with what has been the standard, such as finding methods to make horses quicker. It is sometimes important to look beyond the conventional and create fresh methods of doing things. Instead of making horses quicker, we should create a car that is faster than a horse and can transport a person from point A to point B faster <sup>1</sup>. Similarly, instead of working out how to decrease smoke from charcoal, figure out how to get rid of charcoal as a heating mechanism and design a stove that utilizes smokeless

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heat, which is more efficient and safer. These concepts and techniques have fueled the fast technological advancements seen in recent years, notably in the education sector. The same principles can be applied in education; rather than figuring out strategies to allow teachers to grade more papers accurately, why not automate teachers' tedious efforts by using computerized technology that can do the dirty work of teaching and free up teachers for more innovative tasks where they can deliver the learning process in an effective and efficient manner. In other words, why can't we harness the capability of intelligent computer machines to emulate instructors' roles in tasks involving test design, exam marking, and providing systemic feedback to students?

Simply put, Artificial Intelligence (AI) is the demonstration of intelligence in computers. The goal is to give machines autonomy and intelligence through the use of algorithms that learn from human activity and pattern recognition. The first formal academic introduction to the area occurred in 1956. When computers first appeared, people's conceptions of what they could do with AI were naturally simplistic. There was speculation among scientists of the time that computers might solve algebraic problems. The focus of current AI efforts is on teaching computers to have a reasonable conversation with humans, solve complicated problems, make reliable predictions, and carry out a wide variety of formerly manual tasks automatically <sup>2</sup>.

Artificial Intelligence (AI) gains rapid response in all aspects of human life. Day-to-day life has changed since the wide-spreading adaptability of AI. Through the use of AI tools and techniques, researchers and AI scientists are making their unstinting efforts to make human life more comfortable and technologically advanced. According to the IDC report <sup>3</sup>, businesses may spend close to \$342 billion on hardware, software, and services related to AI. According to the most recent release of IDC's Worldwide Semi-annual Artificial Intelligence Tracker, the market for AI will grow faster in 2022 with 18.8% growth, and will continue to be on track to surpass \$500 billion by 2024 <sup>3</sup>. Figure 1 shows the funding of AI startups in millions of dollars from 2021 to 2025.

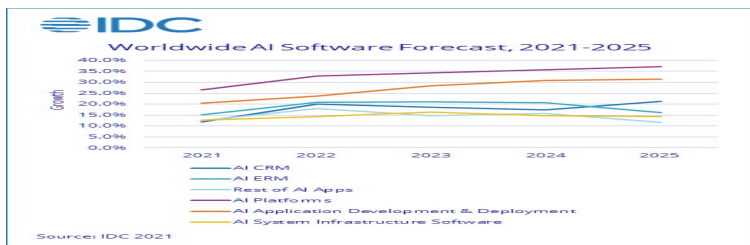


Fig 1.: Worldwide AI Software Forecast 2021-2025 <sup>3</sup>

For the better part of half a century, researchers have been exploring the potential of artificial intelligence technology in classroom settings <sup>4</sup>. Recently, major tech firms like Amazon, Google, and Facebook have spent millions on AIED research and development, joining other well-funded AIED startups like Knewton and Carnegie Learning <sup>5</sup>. Meanwhile, the \$15 million Global Learning XPrize is offering a reward for software that helps students take charge of their own education, which is essentially the same thing as AIED. Meanwhile, AI is being included in the curricula of certain traditional institutions as a new subject area, improving online tutoring, and being studied as a

means of boosting teacher training <sup>6</sup>. In a nutshell, the market for artificial intelligence (AI) in education is expected to increase at a compound annual rate of 32 percent between now and 2024, reaching about \$6 billion in 2022.

The education sector adopts Information Communication Technology (ICT) landscapes; AI is one of the most used ICT paradigms in the education industry <sup>7</sup> [5]. ICT in the education sector has been hyper-adopted. For instance, practical computer education has been declared compulsory in primary schools in France. Furthermore, Learning Management systems (LMS) are widely adopted by an increasing number of educational institutes throughout the globe <sup>8</sup>. Over the past decade, an enormous increase in Massive Online Open Courses (MOOCs) demonstrates society's acceptability of online learning phenomena. These MOOCs not only facilitate students by learning new technologies but also brighten their resumes by giving them a certificate, Nano degrees, and even diplomas <sup>9</sup>. MOOC's massive online tutoring platforms like Preply, Khan academy, code hero, and many more indicate that the market trend of online learning is increasing.

Although many of us may have gained some limited understanding or experience of AI in popular applications through the media or in our day-to-day lives, the use of AI in educational settings continues to be a mystery for many. The thought process automatically generates a great number of unanswered questions. How exactly does artificial intelligence (AI) operate in schools, and what precisely can it do there? How is student privacy protected while using AI, which requires a significant amount of data? What kind of long-term impact will artificial intelligence have on the jobs of educators? Are the advocates of AIED making more claims than they can reasonably deliver? What is the influence of AI on students' performance? Are there social consequences for adopting AI in the educational sector?

The purpose of this study is to look into how artificial intelligence (AI) can be used to improve the learning and teaching process. It provides examples of how AI technology can assist education systems in using modern tools to improve educational equity and quality. The study provides real-world examples of how AI is being used in educational institutions. There are many benefits to the current study. This study will assist a variety of education-sector stakeholders. It will contribute to the expanding research and advancement of knowledge, theory, and empirical findings that identify and debate the many effects of AI on education. It will aid scholars, professionals, and policymakers, including administrators, management, and leadership of educational institutions and the education sector, by promoting evidence-based decision-making and management and leadership practices in the sector. In addition to complementing the findings of previous research, the findings will guide government policies and initiatives targeted at promoting the meaningful use of information technology, namely AI, in the education sector. With an understanding of the impact of AI on the education sector and an evaluation of the exact nature of the impact, such as improved instructional and learning effectiveness, the government, in collaboration with educational institutions, can develop a policy, strategy, and initiatives that promote the positive impact or effects and mitigate the potential negative effects of AI on education. The paper is organized as follows: The following section gives a comprehensive definition of AI in general and AIED in particular. Section 2 tackles how AI can be used in education, while section

three gives an overview of real-life examples of AI applications in the education sector. Section 4 tackles the challenges associated with the use of AI in education. Section 5 concludes the study with some remarks on the future use of AIED.

## **2 Artificial Intelligence Definition**

Through the years, advances in computing and information transmission technologies have led to the creation of artificial intelligence. This was made possible by continuing technological progress. Artificial intelligence is simply utilizing computer machines to think and act humanly and rationally. The previous definition has four dimensions: think humanly, act humanly, think rationally, and act rationally.

### **2.1 AI System That Think Humanly**

AI is defined by Haugeland<sup>10</sup> as the exciting new quest to make computers think or to have robots with brains in the literal sense. It is also defined as the automation of tasks associated with human thought, such as decision-making, problem-solving, and learning.

### **2.2 AI System That Acts Humanly**

Mimicking human action, (AI) is defined as the art of designing machines that execute activities that require intellect when performed by people<sup>11</sup>. Another definition of AI is the study of how to make computers do things at which, at present, people are superior. In other words, AI can be defined as the study of how to make computers do things.

### **2.3 AI System That Think Rationally**

Examining it from a rational standpoint, AI is defined as the study of mental capabilities through the use of computational models<sup>12</sup>, while Winston<sup>13</sup> describes it as the study of computations that make it possible for humans to see, think, and act.

### **2.4 AI System That Act Humanly**

Ginu<sup>14</sup> defined AI as the study of the design of intelligent agents, while Nilsson<sup>15</sup>) associated it with intelligent behavior in artifacts. Based on the preceding definitions, it is possible to conclude that artificial intelligence is the result of computers and intelligent agents providing tools with the ability to think smart enough to perceive, reason, and act like humans in a variety of tasks such as decision-making, problem-solving, learning, and automating redundant and tedious tasks.

## **3 Artificial Intelligence Definition**

AIED is the practice of utilizing computers and other devices to simulate human perception, decision-making, and other processes to carry out a task. In other words,

AI refers to the process through which robots match complex patterns and learn as they do so. The nature of AI may be understood in a variety of ways. Two examples AI with rules-based and AI with machine learning-based evaluation methods are two examples. The former generates a suggestion or a solution using decision-making rules which is the most fundamental shape in this sense. An intelligent teaching system (ITS), which can provide students with detailed and targeted feedback, is an illustration of this sort of technology. Since machines can truly learn and improve over time, machine learning-based AI is more potent (especially concerning [14]).

AIED encompasses everything from AI-driven, step-by-step personalized instructional and dialogue systems, to AI-supported exploratory learning, the analysis of student writing, intelligent agents in game-based environments, and student support. Additionally, it encompasses students' engaging one-on-one with computers, techniques that include the entire school, students utilizing mobile phones outside of the classroom, and a great deal more besides. In addition to this, AIED has the potential to shed light on various learning and educational methods <sup>6</sup>.

### 3.1 Leveraging AI towards Improving the Learning Process

The following section explores how AI may be used to improve learning and equity in education in the classroom setting. The section focuses on two primary topics: enhancing personalization using AI (pedagogical scale) and school management information systems (system management scale).

#### Promoting Personalized Learning

In the last decade, the effectiveness of traditional education has been repeatedly questioned. College dropout rates are at an all-time high, a testament to disinterested students and low student morale. According to industry experts, the main reason for the school's failure to keep students interested in the "one-size-fits-all" methodology <sup>16</sup>. Fortunately, advances in AI technology, especially in areas of Big Data and Machine Learning, have already yielded results. Several startups have developed tools to make learning more enjoyable for learners and more custom-made to fit their needs. This is largely accomplished by designing a personalized learning experience based on the abilities and preferences of the students. Personalized learning is a learning experience that is tailored to each student's specific needs. Learning elements such as learning speed, material, series, technologies, quality, instructional approach, instructional materials, and other aspects of personalized learning can be tailored to each child's needs and learning goals <sup>17</sup>.

Adapting learning to meet the requirements of individual students has been a concern for educators for years, but AI could provide a level of differentiation that is unthinkable for teachers who must handle 30 students in each class. Several companies, including Content Technologies and Carnegie Learning, are currently developing intelligent instructional design and digital platforms that use AI to provide learning, testing, and feedback to students from pre-K to college level, identifying gaps in knowledge and redirecting them to new topics when appropriate<sup>18</sup>. As AI advances, it may be conceivable for a machine to scan the expression on a student's face that suggests they are

trying to understand a subject and alter a lesson to respond to that. Customizing curricula to meet the requirements of each student is not feasible now, but it will be for AI-powered robots.

AI can assist in the improvement of collaborative learning. One of the most groundbreaking elements of computer-supported collaborative learning occurs when participants are not physically present in the same area. It gives students a variety of options for when and where they want to learn. Online asynchronous discussion groups are crucial in computer-supported collaborative learning. AI systems monitor asynchronous discussion groups using AI techniques like machine learning and shallow text processing, providing teachers with information on learners' discussions as well as help for encouraging learners' engagement and learning. AI may aid customized learning in a variety of ways. AI can assist in creating a more professional atmosphere for dealing with students who are struggling. Teachers spend a lot of time at school on regular and administrative chores like preparing assignments and addressing frequently requested inquiries. A dual-teacher approach, which includes a teacher and a virtual teaching assistant who can take over routine tasks for the instructor, frees up teachers' time, allowing them to focus on student supervision and one-on-one contact. Teachers have already begun collaborating with AI assistants to achieve the greatest results for their students<sup>19</sup>.

With the help of AI, adaptive learning platforms can construct scientifically generated profiles of each learner, and big data, with its pervasive informational power, assists in the construction of a pedagogical profile for students. The objective of attaining a particular learning outcome can be attained via a personalized path. Students can work at their own pace and advance when they have mastered a concept when using adaptive learning platforms that are aided by artificial intelligence<sup>20</sup>.

The Computer Assisted Learning (CAL) sector develops digital and AI-based alternatives to help students learning processes. An AI solution may assist in mapping each student's specific learning plans and trajectories, as well as their strengths and weaknesses, topics that are more expensive to integrate or learn, as well as their learning preferences and activities. By using algorithms to help students traverse diverse curriculum routes, AI can personalize learning and increase chances for students. Recent studies have shown that Intelligent Tutoring Systems are among the new technical alternatives for enhancing educational learning in poor nations<sup>21</sup>.

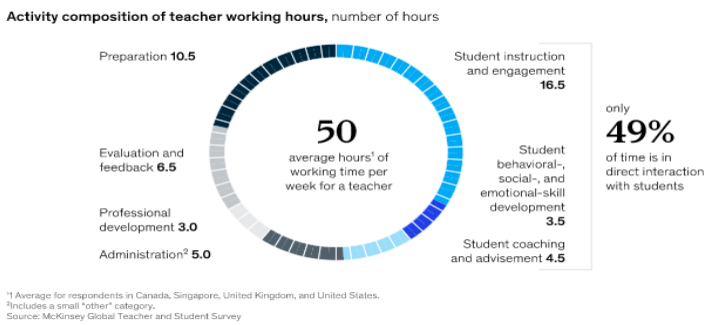
### **Improving in Teachers' Collaboration**

AI has previously been used in education, particularly in skill development tools and assessment systems. As AI educational solutions improve, the aim is that AI will be able to cover gaps in learning and teaching, allowing schools and instructors to accomplish more than ever before. AI may increase efficiency and personalization, and reduce administrative processes, giving instructors more time and flexibility to give understanding and adaptability—human characteristics that robots lack. By combining the finest qualities of machines and instructors, the objective of AI in education is for them to collaborate to achieve the best results for children. Because today's kids will need to work in a world where AI is a reality, we must prepare them<sup>18</sup>.

### Automatic Routine Tasks

As a teacher or school administrator, you may be curious about how automated software for special education works. Robotic Process Automation (RPA), does not suggest that robots will replace instructors in the classroom. In actuality, automation does not substitute for a process. Instead, automation enhances a process. In layman's terms, robotic process automation (RPA) is yet another method for developing efficient work processes using algorithms and software robots (Bots) capable of doing tasks without human intervention: Every digital gadget utilizes algorithms to some degree. In automated software for special education, an algorithm is a collection of exact instructions that instruct a device on how to accomplish a job or process data<sup>22</sup>. According to a McKinsey & Company worldwide study, teachers were spending less time on direct teaching and engagement and more time on preparation, assessment, and administrative chores. Concurrently, it has been discovered that technology may assist instructors in reallocating 20–30% of their time to student learning. By incorporating AI educational technology, instructors will not only be able to be more productive and spend less time on repetitive duties, but they will also be able to interact with their students on a deeper level. Having additional time and energy to foster a better and more powerful connection between a student and a teacher is likely to enhance a student's learning outcomes and raise their chances of success<sup>23</sup>.

**Teachers work about 50 hours a week, spending less than half of the time in direct interaction with students.**



McKinsey & Company

Figure 2: Teachers' Administrative Tasks<sup>23</sup>

An AI system may track students' individualized education program (IEP) data and automatically offer support to help instructors provide appropriate adjustments for their students. In a learning management system, for instance, if a student needs more time to complete an assignment, the system may either compile a list to be sent to the instructor or manually change the due date for that student's work. In this paper, we highlight the importance of AI systems' ability to interface with or be included in other systems. The system must also ensure that individual students' private information is protected at all times. In addition to the text-to-speech and speech-to-text features, an AI system may also provide personalized read-aloud capabilities for kids with special needs<sup>24</sup>.

### Social Networking Sites and Chatbots

Social networking sites (SNSs) use social media to link students and instructors. Researchers have underlined the value of utilizing social networking sites (such as Facebook) to extend learning opportunities outside of the classroom, monitor students' well-being, and strengthen student-teacher relationships. Various academics have investigated the function of social media in education, outlining its influence on student and teacher learning as well as scholarly communication. They argue that using social media may promote students' active learning, cooperation abilities, and connections with communities outside of the classroom. Chatbots may also be found on social media platforms thanks to various AI algorithms. They are also known as conversational agents or dialogue systems<sup>25 26</sup>. Chatbots are useful because they can react naturally and in a conversational tone. For example, at Georgia State University, a text-based chatbot system named "Pounce" was employed to assist students with registration and admission, as well as financial assistance and other administrative chores"<sup>27</sup>.

### **Using AI with Big Data**

Rapid advances in big data and artificial intelligence (AI) technologies have had a significant impact on all aspects of human society, including the economy, politics, science, and education. Many of our social activities can continue despite the COVID-19 pandemic, thanks in large part to these developments. The use of digital tools, platforms, applications, and interpersonal communication has generated vast quantities of data ('big data') in disparate locations. Big data technologies seek to harness the power of massive amounts of data in real-time or otherwise<sup>28</sup>. Big data analytics typically involves the collection, analysis, and evaluation of large datasets. The extraction of actionable knowledge and viable patterns from data is commonly viewed as one of the primary advantages of the big data revolution<sup>29 25</sup>. Statistical analysis, data mining, data visualization, text analytics, social network analysis, signal processing, and machine learning are a few of the technologies and tools utilized in big data analytics. Every day, digital systems create an astounding 2.5 quintillion bytes of fresh data. 1. Although this information is often held in big data silos where it is easily accessible to consumers, companies have been collecting their data to become more efficient and productive for years. "Artificial Intelligence enables data owners to convert a passive resource into a potent development accelerator"<sup>22</sup>.

Machine learning-based AI is more powerful since computers can truly learn and improve over time, especially when dealing with big, complex datasets. Machine learning-based AI technologies in education may be used for several activities, such as monitoring student behavior and developing models that effectively anticipate student outcomes. While machine learning-based AI is still in its early stages, it has already demonstrated amazing outcomes for challenging tasks that are not restricted by rules, such as assessing students' written replies or analyzing big, complex datasets. Other significant contrasts exist within AI, primarily dependent on technical application cases. Natural language processing, or the use of machines to interpret text, is one sub-field<sup>30</sup>.

Predictive analytics and facial recognition systems Students' facial expressions are captured and monitored using face recognition software. These systems give instructors insights about students' behaviors throughout the learning processes, allowing



them to act or intervene, assisting teachers in developing learner-centered practices and increasing student engagement. Based on statistical analysis, predictive analytics algorithm systems are mostly used to find and recognize trends concerning learners. These analytics, for example, may be used to identify university students who are in danger of failing or failing a course. Using these identifications, teachers may intervene and provide students with the assistance they need <sup>27 26</sup>.

## 4 The Challenges of the Use of AI in Education

Educational institutions will probably discover that there are still a lot of problems to be overcome when they start to apply AI to diverse processes. The ideal approach for educational institutions to educate students about the new technology-based society and the numerous disruptive technologies that will alter the way people work is arguably the most important issue to solve. Students must comprehend that increasingly repetitive and rote work will eventually be mechanized and carried out by robots, artificial intelligence, and automation. However, there will always be jobs that call for creativity, intellect, and emotional intelligence. Many institutions nowadays fail to teach students about the sorts of abilities that will and won't be necessary for their future careers <sup>31</sup>.

### 4.1 Privacy Concerns

Privacy is a key concern when it comes to using AI tools in education. Privacy issues arise mostly when individuals reveal an excessive quantity of personal information on internet platforms." Although current regulations and standards exist to safeguard sensitive personal data, transgressions by AI-based tech businesses in terms of data access and security raise people's privacy worries. Akgun and Greenhow <sup>27</sup>. To solve issues, AI relies largely on algorithms, which are fed by personal data. "These algorithms do not arise in a vacuum; rather, they form and are changed by ever-evolving cultural, social, institutional, and political forces and structures" <sup>1</sup>. Fitness trackers, for example, generate information about persons that did not previously exist but might now be deemed personal information. However, this poses significant regulatory concerns in the context of "trustworthy AI," including data privacy and security, as well as possibly improper data, and uses leading to prejudices against people or groups <sup>32</sup>. Furthermore, there is a potential monitoring and tracking concern with AI in that the AI technologies would acquire precise information about students' and instructors' behaviors and preferences. AI tracking systems utilize algorithms and machine-learning models to not only monitor behaviors but also predict their users' future preferences and actions. To forecast students' learning performances, strengths, weaknesses, and learning patterns, surveillance methods may be included in AI's predictive systems. According to studies, instructors who utilize social networking sites (SNSs) for instructional reasons face a variety of issues, including worries about privacy limits, friendship authority, responsibility, and availability <sup>25</sup>. How do these technologies protect users' privacy? How can schools get the acceptance of both students and parents while introducing them? Should researchers and other outside parties have access to anonymized data?

Further to the privacy concerns, the proposed AI system assists instructors in doing what they do best by assisting them in ensuring their students get the accommodations they need and then documenting those accommodations. Using such systems has risks, and AI systems that interact with student IEP data must adhere to the strictest data protection and monitoring standards. As previously noted, educators must be involved—for example, the teacher is in charge of providing feedback, but the system may provide ideas to assist the instructor in providing better feedback. If educators are not kept informed, students may suffer negative repercussions. Educators must be cautious and not assume that every adjustment recommended by an AI system is the right or the best option<sup>33</sup>

## 4.2 Lack of Emotional Bonds

Another point to consider is the significance of social and emotional bonds, as well as the very human experience of education. Simply said, artificial intelligence will not replace teachers. Bias is also cited as a disadvantage of AI experts. Machine-generated scores will be based on the outcomes of thousands of tests. However, as stated in this topic brief, test scores may indicate a lack of opportunity rather than a lack of competence. These distinctions will be impossible for machine scoring to make<sup>34</sup>.

### Jobs

Despite the great benefits that AI may provide to enhance teaching and learning through task automation, the development of AI applications in education introduces significant ethical considerations and challenges. For example, in times of budget constraints, administrators may be tempted to substitute instruction with lucrative automated AI solutions. Faculty, teaching assistants, student counselors, and administrative personnel may be concerned that intelligent tutors, expert systems, and chatbots may replace them. AI can increase the capabilities of learning analytics, but such systems need massive volumes of data, including sensitive information about students and professors, raising severe privacy and data protection concerns. Some institutes, such as the Institute for Ethical AI, have recently been founded<sup>8</sup>.

## 4.3 Disruptive Technology

While this research has shown that AI has a wide range of potential applications, it may also be a disruptive technology that exacerbates current disparities and divisions since the marginalized and underprivileged population is more likely to be excluded from AI-powered education. As a result, there is a new type of digital divide: one in the use of data-based information to support wise decision-making<sup>35 26</sup>. The most difficult aspect of adopting AI in school instruction is financial planning and strategy. The majority of the time, budget forecasting becomes quite difficult. For example, if all schools can have a robot helper, the potential power consumption will increase. Then governments would be required to fund a substantial budget for recovering costs. In addition, electricity is not a renewable resource, which is another unfavorable aspect of this issue. Understanding the available AI-based learning tools and how they might aid students is crucial to overcoming this obstacle. The challenges of using AI in education in underdeveloped nations have been sketched out by recent studies. The primary ones are

the following: 1-Accessibility of ICT hardware; 2-Electrical accessibility; 3-Internet dependability; 4-Data expenses; 5-Students' fundamental ICT abilities; 6-Language; and 7-Lack of culturally relevant material <sup>36</sup>. The application of data-based knowledge for informed, intelligent decision-making is a new digital divide created by the absence of fundamental infrastructures, according to further assessments on the introduction of big data in developing nations <sup>35</sup>.

#### 4.4 Technology Addiction

In the past, going to school required kids to put away their smartphones and tablets and open their old textbooks. The use of technology in every class has made it impossible for kids to imagine what their lives will be like in the future without it. Because of it, society will have a large number of individuals who are addicted to technology yet lack social skills after a few decades. The reason for this is that AI can encourage technological addiction <sup>37</sup>.

#### 4.5 Promoting Bias

The ethical issues and threats provided by AI systems seem to contradict marketing efforts that portray algorithms to the public as objective and value-neutral instruments. Algorithms, in essence, mirror the ideals of their creators who occupy positions of authority. When humans construct algorithms, they also produce a collection of data that represents society's historical and systemic prejudices, which eventually become algorithmic biases. Even though prejudice is built in the algorithmic model with no conscious goal, we may detect a variety of gender and racial biases in various AI-based platforms <sup>27</sup>.

#### 4.6 Less Flexibility

No matter how analytical AI robots are, they cannot grow a student's mind as flexibly as a teacher can. Educators may give a variety of problem-solving strategies, while AI lacks different teaching strategies. AI likewise functions on the idea of "trash in, garbage out." Although it can identify faults, it cannot remedy them. If a person makes a mistake when inputting data, AI still does the analysis. However, the final result will indicate that mistakes exist. Therefore, time is wasted and the procedure must be redone

<sup>38 39</sup>.

## 5 Conclusion

Although there is some overestimation of what artificial intelligence (AI) can achieve in our lives, it is probably the main technological force of the first part of this century, and it will change practically every industry, if not human efforts in general. Businesses and governments throughout the globe are investing massive amounts of money in a broad range of initiatives, and hundreds of start-ups are receiving billions of dollars in funding. It would be unrealistic to believe that AI would not influence

education, given that conventional education is in desperate need of a makeover to adapt to the current technological world.

Because of their enthusiasm for one or more technologies, consumers are sometimes drawn to a specific facet of that technology and fail to consider its underlying components. However, with AI, such an assumption is not sustainable since there is so much promise for AI that people are hesitant to even learn about its basic characteristics. The notion that AI would make our lives simpler by eliminating monotonous everyday jobs makes it appealing enough to be around for a long time. AI is a growingly strong technology with applications that extend beyond the academic and commercial realms and will undoubtedly have a worldwide influence.

The numerous platforms and trends offered by the future of AI development in the education sphere are highly enticing and, in some circumstances, impossible in certain realities. However, computer-based learning methods are unlikely to completely replace human teaching in schools. Is it permissible to apply and invest in AI in specific instances of Africa and Latin America? Yes, since such technologies are critical to addressing long-term development in the area, catalyzing competitiveness and productivity elements to accomplish a true potential transformation with new and better prospects in the global market <sup>40</sup>.

In conclusion, applications of AI can enhance students' and teachers' educational experiences and support them in resolving issues and challenges related to instruction. However, AI can not take the place of interpersonal communication. There are many different learning needs and styles among students. Although AI can help teachers save time and improve their cognitive skills, it is only one tool in their arsenal. Therefore, to fully benefit from AI applications in education while minimizing costs, teachers and students need to comprehend the constraints, potential risks, and moral issues associated with doing so.

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