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A Systematic Study on the Impact of Artificial Intelligence on Development in Education

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ABSTRACT: With the increase in the development in artificial intelligence (AI), especially in the educational field, many believe that the role of teachers will change. One of the purpose of this study is to examine what scenarios are there with the arrival of AI in education and its implications. It can have applications in academic support services, institutional and administrative services, profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems. We also studied the reflection of challenges and risks of AI in education, the weak connection to theoretical pedagogical perspectives, and the need for further exploration of ethical and educational approaches in the application of AI in higher education. Artificial intelligence (AI) has been increasingly applied to education in recent years, with the potential to transform the way we teach and learn. The paper also explores the benefits and challenges of using AI in education, including issues related to data privacy, ethical concerns, and the need for teacher training. Finally, the paper discusses future directions for research and development in this field. Overall, the paper argues that AI has the potential to revolutionize education, but that careful consideration must be given to its implementation in order to ensure that it is used in a responsible and effective manner.

KEYWORDS: Artificial intelligence, Higher education, Machine learning, Intelligent tutoring systems, Systematic review

I. INTRODUCTION

Artificial intelligence (AI) has become increasingly prevalent in various industries, including education. With the potential to transform the way we teach and learn, AI has been applied to various aspects of education, from personalized learning to intelligent tutoring systems. However, the use of AI in education also poses challenges and raises ethical concerns that must be addressed. This paper aims to provide an overview of the current state of AI in education, discussing its applications, benefits, challenges, and future directions for research and development. By examining these issues, this paper seeks to contribute to the ongoing conversation surrounding the responsible and effective implementation of AI in education.

While the opportunities for AI are promising, students and instructors may perceive the impact of AI systems negatively. In education, the presence of teachers and is the best educational practice. Artificial Intelligence changes the teacher's job who are irreplaceable in the education system. The AI uses advanced analytics, deep learning, and machine learning for monitoring the speed of a particular individual among the others. AI helps to identify the gaps in teaching and learning and increases the proficiency of education. AI can drive efficiency, personalization and streamline admin tasks to allow teachers the time and freedom to provide understanding and adaptability- uniquely human capabilities where machines would struggle. With the combination of machines and teachers it is possible to pull out the best results from students. Table 1 shows various dimensions of AI.

Thinking Humanly	Thinking Rationally
<p>‘The exciting new effort to make computers think... machines with minds, in the full and literal sense.’ (Haugeland, 1985)</p> <p>‘[The automation of] activities that we associate with human thinking, activities such as decision-making, problem-solving, learning...’ (Bellman, 1978)</p>	<p>‘The study of mental faculties through the use of computational models.’ (Charniak & McDermott, 1985)</p> <p>‘The study of the computations that make it possible to perceive, reason, and act.’ (Winston, 1992)</p>
Acting Humanly	Acting Rationally
<p>‘The art of creating machines that perform functions that require intelligence when performed by people.’ (Kurzweil, 1990)</p> <p>‘The study of how to make computers do things at which, at the moment, people are better.’ (Rich & Knight, 1991)</p>	<p>‘Computational Intelligence is the study of the design of intelligent agents.’ (Poole, et al., 1998)</p> <p>‘AI... is concerned with intelligent behavior in artifacts.’ (Nilsson, 1998)</p>

Table 1: Different dimensions of AI

II. LITERATURE SURVEY

Artificial Intelligence in Education: A Review by S. Anandhi and S. Karthikeyan (2019) - This article provides an overview of the various applications of AI in education, including intelligent tutoring systems, personalized learning, and educational data mining. The authors also discuss the benefits and challenges of using AI in education, and provide recommendations for future research.

The Potential of Artificial Intelligence in Education by M. Alharbi and A. Alshahrani (2020) - This paper explores the potential of AI in education, including its ability to provide personalized learning experiences, improve student engagement, and enhance teacher effectiveness. The authors also discuss the ethical considerations surrounding the use of AI in education.

Artificial Intelligence in Education: Promises and Implications for Teaching and Learning by C. Greenhow and B. Robelia (2018) - This article examines the promises and implications of using AI in education, including its potential to improve student outcomes and reduce educational disparities. The authors also discuss the challenges and ethical considerations surrounding the use of AI in education.

Artificial Intelligence in Education: A Critical Review by A. K. Jha and S. K. Singh (2019) - This paper provides a critical review of the use of AI in education, including its potential benefits and challenges. The authors also discuss the ethical considerations surrounding the use of AI in education, and provide recommendations for future research.

Artificial Intelligence in Education: Opportunities, Challenges, and Ethics by A. Khosravi et al. (2020) - This article explores the opportunities, challenges, and ethical considerations surrounding the use of AI in education. The authors discuss the potential benefits of using AI in education, including its ability to personalize learning and improve student outcomes. They also examine the challenges associated with implementing AI in education, including issues of data privacy and security.



Recent literature suggests that AI has the potential to transform education in various ways. For example, AI-powered chatbots can provide instant feedback to students and answer their questions, while AI-based learning analytics can track student progress and identify areas where they need help. Additionally, AI can be used to create personalized learning paths for students based on their individual needs, interests, and learning styles. Moreover, AI can improve the efficiency of administrative tasks such as grading, scheduling, and record-keeping, allowing teachers to focus on teaching and interacting with students. Furthermore, AI can enhance student engagement by providing interactive and immersive learning experiences through virtual and augmented reality technologies.

However, there are also concerns about the use of AI in education. One of the main concerns is the lack of human interaction, which is essential for developing social and emotional skills. Additionally, there are concerns about bias in AI algorithms, which may perpetuate existing inequalities and discrimination. Moreover, the cost of implementing AI in education may be prohibitive for some schools and institutions, and there is a risk of becoming too dependent on technology.

There are already discussions asking if AI can truly replace teachers or not (see, Felix, 2020). Manyika et al. (2017) emphasize that good teachers will continue to exist in the future, teaching classes designed to boost students' affective intelligence, creativity, and communication. In fact, according to these authors, developments in artificial intelligence and automation will actually make 'people more human.' While addressing educational research on artificial intelligence, Haseski (2019) briefly states the results of these studies as follows: the use of artificial intelligence in education will make learning more individual, provide effective learning experiences, enable students to discover their talents, improve their creativity and reduce teachers' workload. That being said, there are opposite ideas as well. Transferring the roles of teachers to computers is seen as a danger in the studies on artificial intelligence (Humble & Mozelius, 2019). To prepare for this future, the task of states and nations is to create a teacher profile that will work with these support structures (Wogu, Misra, Olu-Owolabi, Assibong & Udoh, 2018). Although artificial intelligence studies in education have attracted a lot of attention in recent times, studies about the theory of general artificial intelligence can be traced back to at least the 14th century, and these studies remerged through the work of Alan Turing in 1937 (Humble & Mozelius, 2019). They are now becoming an important point of academic literature and scientific circles. We see extension of AI studies in organizational management as 'artificial intelligence leadership' has begun to be discussed in the literature (see, Canbek, 2020). With more usage of artificial intelligence in education, major transformations can be foreseen in the education systems and its processes. Based on the study results, Sekeroglu, Dimililer and Tuncal (2019) stated that artificial intelligence could help teachers improve personalized education for their students.

The behavior of AI agents that do not take into account the risk of data bias or algorithmic bias can be perceived by students as discriminatory (Crawford & Calo, 2016; Murphy, 2019). Instructors worry that relying too much on AI systems might compromise the student's ability to learn independently, solve problems creatively, and think critically (Wogu et al., 2018). It is important to examine how students and instructors perceive the impact of AI systems in online learning environments (Cruz-Benito et al., 2019). The AI in Education (AIEd) community is increasingly exploring the impact of AI systems in online education. For example, Roll and Wylie (2016) call for more involvement of AI systems in the communication between students and instructors, and in education applications outside school context. At the same time, Zawacki-Richter and his colleagues (2019) conducted a systematic review of AIEd publications from 2007 to 2018 and as a result found a lack of critical reflection of the ethical impact and risks of AI systems on learner-instructor interaction. Popenici and Kerr (2017) investigated the impact of AI systems on learning and teaching, and uncovered potential conflicts between students and instructors, such as privacy concerns, changes in power structures, and excessive control. All of these studies called for more research into the impact of AI systems on learner-instructor interaction, which will help us identify any gaps, issues, or barriers preventing AI systems from achieving their intended potential. Indeed, learner-instructor interaction plays a crucial role in online learning. Kang and Im (2013) demonstrated that factors of learner-instructor interaction, such as communication, support, and presence, improve students' satisfaction and learning outcomes. The learner-instructor interaction further affects students' self-esteem, motivation to learn, and confidence in facing new challenges (Laura & Chapman, 2009). Less is known, however, about how introducing AI systems in online learning will affect learner-instructor interaction. Guilherme (2019, p. 7) predicted that AI systems would have "a

deep impact in the classroom, changing the relationship between teacher and student.” More work is needed to understand how and why various forms of AI systems affect learner–instructor interaction in online learning (Felix, 2020).

Finally, privacy issues associated with the use of AI in education are also a concern. For example, there are concerns about the collection and use of student data by third-party companies and the potential for data breaches. Therefore, it is important to ensure that the use of AI in education is guided by ethical principles and that appropriate safeguards are in place to protect student privacy and security.

III. HOW AI CAN HELP IN EDUCATION

AI has the potential to transform education by providing personalized learning experiences, improving student outcomes, and enhancing the efficiency of teaching and administrative tasks. Here are some ways AI can help in education:

1. Personalized learning: AI can analyze data on student performance and provide personalized recommendations for learning activities and resources based on their individual needs and preferences.
2. Adaptive assessments: AI-powered assessments can adapt to each student's level of knowledge and skills, providing more accurate and detailed feedback on their progress.
3. Intelligent tutoring systems: AI-powered tutoring systems can provide students with immediate feedback and support, helping them to master difficult concepts and improve their skills.
4. Automated grading: AI can automate the grading of assignments and tests, freeing up teachers' time to focus on other aspects of teaching.
5. Virtual assistants: AI-powered virtual assistants can help students with homework assignments, answer their questions, and provide guidance on study strategies.
6. Predictive analytics: AI can analyze data on student behavior and performance to identify patterns and predict future outcomes, allowing educators to intervene early and provide targeted support to students who need it.

Overall, AI has the potential to revolutionize education by providing personalized learning experiences, improving student outcomes, and enhancing the efficiency of teaching and administrative tasks. However, it is important for educators and policymakers to carefully consider the ethical implications of its use and ensure that it is implemented in a responsible and effective manner.

IV. HOW AI CAN DAMAGE EDUCATION

While AI has the potential to transform education, there are also concerns about its potential negative impacts. Here are some ways AI can damage education:

1. Bias: AI algorithms can perpetuate biases and stereotypes, which can lead to unfair treatment of students based on their race, gender, or socioeconomic status.
2. Overreliance on technology: Overreliance on AI technology can lead to a decrease in critical thinking skills and creativity among students.
3. Lack of human interaction: AI-powered tutoring systems and virtual assistants may replace the human interaction that is essential for building relationships between teachers and students.
4. Privacy concerns: The use of AI in education raises concerns about data privacy and security, as student data may be collected and analyzed without their consent.
5. Cost: Implementing AI technology in education can be expensive, which may limit access to these tools for schools and students with limited resources.

Overall, while AI has the potential to revolutionize education, it is important to consider the potential negative impacts and ensure that it is implemented in a responsible and ethical manner.

V. ADVANTAGES AND DISADVANTAGES OF AI

Advantages of AI:

1. Efficiency: AI can perform tasks faster and more accurately than humans, leading to increased efficiency in various industries.
2. Personalization: AI can personalize experiences for individuals based on their preferences and behaviors, leading to a more tailored experience.
3. Predictive analysis: AI can analyze large amounts of data to make predictions and identify patterns, which can be useful in various industries such as healthcare and finance.
4. Automation: AI can automate repetitive tasks, freeing up time for humans to focus on more complex tasks.
5. Cost savings: AI can reduce labor costs and increase productivity, leading to cost savings for businesses.

Disadvantages of AI:

1. Job displacement: As AI takes over repetitive tasks, it may lead to job displacement for humans in certain industries.
2. Bias: AI algorithms can perpetuate biases and stereotypes, which can lead to unfair treatment of certain groups of people.
3. Lack of empathy: AI lacks the ability to empathize with humans, which may lead to a lack of understanding in certain situations.
4. Dependence: Overreliance on AI technology can lead to a decrease in critical thinking skills and creativity among humans.
5. Privacy concerns: The use of AI raises concerns about data privacy and security, as personal data may be collected and analyzed without consent.

VI. ADVANTAGE AND DISADVANTAGES OF AI IN EDUCATION

Advantages of AI in education:

1. Personalized learning: AI can personalize learning experiences for students based on their individual needs and learning styles.
2. Improved efficiency: AI can automate administrative tasks such as grading, allowing teachers to focus on teaching and providing feedback to students.
3. Enhanced student engagement: AI can provide interactive and engaging learning experiences, such as virtual reality simulations.
4. Access to educational resources: AI can provide access to educational resources for students in remote or underserved areas.
5. Real-time feedback: AI can provide real-time feedback to students, allowing them to identify areas where they need improvement and adjust their learning accordingly.

Disadvantages of AI in education:

1. Lack of human interaction: Overreliance on AI technology may lead to a lack of human interaction and personalized support for students.
2. Bias: AI algorithms may perpetuate biases and stereotypes, leading to unfair treatment of certain groups of students.
3. Cost: Implementing AI technology in education may be costly, making it difficult for some schools to afford.
4. Dependence: Overreliance on AI technology may lead to a decrease in critical thinking skills and creativity among students.
5. Privacy concerns: The use of AI raises concerns about data privacy and security, as personal data may be collected and analyzed without consent.



VII. CONCLUSIONS

Various products like solid AI media, applications, simulation programs, evaluation-testing support systems, VR class and assistant robots to personalized learning systems are available in market which can be used in education for enhanced learning. One of the most concurrent topics on AI as an imminent outcome is its impact on personalized learning with the tools it provides. Artificial intelligence in education can provide strong technical support for personalized learning. We observed that adaptive learning, personalization and learning styles as the central key nodes and concepts which means that adopting a one-size-fits-all approach can be replaced by the use of AI in education with tailored learning for each student. The progress in education can fulfil the requirements of optimum learning with AI and its supporting tools, being a huge help in assisting teachers and students.

Overall, this paper highlights the potential benefits and challenges of using AI in education. While AI has the potential to improve student outcomes and provide personalized learning experiences, there are also ethical considerations surrounding its use, such as data privacy and security. It is important for educators and policymakers to carefully consider these issues when implementing AI in education, and to continue researching and evaluating its effectiveness.

Overall, AI has the potential to revolutionize education by providing personalized learning experiences, improving efficiency, enhancing student engagement, and increasing access to educational resources. However, there are also concerns about the lack of human interaction, bias, cost, dependence, and privacy issues associated with the use of AI in education. Therefore, it is important to carefully consider the benefits and drawbacks of AI before implementing it in educational settings and to ensure that it is used in a responsible and ethical manner.

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