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The Impact of Artificial Intelligence on the Development of Education

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Abstract: The role of Artificial Intelligence (AI) in education has received widespread attention. However, the latest research focusing on cost-benefit analysis is relatively scarce. This essay analyzes the opportunities and challenges of AI in the development of education. This essay analyzes that the potential of AI in the field of education mainly focuses on improving the efficiency of teacher teaching and evaluation, promoting personalized learning, and advancing the concept of inclusive education. The main challenges faced are AI bias, teacher marginalization, and the phenomenon of students overly relying on AI. Based on this, this essay proposes suggestions to reduce the risks of AI use in education through the interaction of supervisory intervention and personal norms. Among them, in terms of supervision and intervention, it is recommended that supervisory agencies and teachers intervene in a dual track manner; Personal norms require teachers and students to constantly strive for self-discipline. Find a balance point to maximize the role of AI in educational development.

Keywords: Artificial Intelligence, Educational Development, Education

1. Introduction

With the Fourth Industrial Revolution pushing society towards the era of intelligent automation, artificial intelligence (AI) has rapidly become an emerging force in the field of education. According to statistic, the global AI education market is expected to reach $5.88 billion in 2024, with a compound annual growth rate of 31.2% from 2025 to 2030 [1]. The emergence of AI technology presents a thriving trend. AI has its unique features, as it is difficult to reach human intelligence. However, AI surpass humans in processing large amounts of data [2]. Therefore, cleverly combining the two traits of AI in teaching may leverage its unique advantages. There are also many emerging software supporting the integration of AI into the field of education. CGScholar (Common Ground Scholar) is a software for evaluating the potential of AI in educational environments, jointly developed by educational science research institutes and other parties [2]. ChatGPT is an AI chat-bot launched in 2022, redefining the educational paradigm and bringing a brand new educational experience to both students and teachers [3]. The development of AI in the field of education is already flourishing. A global survey conducted in 2023 on over 17,000 people found that more than half of them either do not trust AI systems or are concerned about potential risks. Meanwhile, 85% of people believe that AI will bring a series of benefits [4]. The World Economic Forum's report

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"Shaping the Future of Learning: The Role of AI in Education 4.0" also emphasizes this trend and points out that integrating AI technology into education is promising. However, it is also important to recognize the potential risks of applying AI in education. This indicates that AI is a double-edged sword that needs to find a balance in order to unleash its potential. This essay will explore how to maximize the benefits of AI in teaching, focusing on AI's potentials and risks in in education. This research holds significant importance for the future of educational development.

2. Potentials of AI in education

Compared to traditional teaching modes, AI technology serves as a powerful tool that can enhance the educational and teaching environment in various ways, filling gaps in some traditional learning models. Firstly, AI technology can improve teaching efficiency by reducing the pressure of repetitive work for teachers. Secondly, it can break the deadlock of traditional education and promote the development of personalized education. Finally, it helps to promote the development of inclusive education through various AI tools.

2.1. Enhancing teaching and assessment efficiency

AI can alleviate the administrative workload of educators, allowing them to devote more time to teaching. Teachers are responsible for some administrative tasks that focus on students and the curriculum. These tasks often include lesson planning, grading, progress reports, classroom management, and recording attendance. These tasks are present in almost every day's work in the teaching and will take up a lot of time and energy. With the widespread application of AI in education, the issue of low teaching efficiency has been improved. Many emerging AI systems have been extended to teaching. In September 2024, the Ministry of Education of the United Arab Emirates, in collaboration with other departments, released an AI Tutor Project. AI tutors can develop courses based on students' situations, provide multilingual support, and automate certain teaching tasks. This project aims to alleviate the burden on teachers [5]. iFlyTek has integrated intelligent marking technology for paper-and-pencil exams and online scanning marking technology, providing an intelligent assessment system that significantly enhances the quality and efficiency of teachers' marking work [6]. The AI-driven learning management systems (LMS) provide various functions to enhance teaching and administrative efficiency, such as learning data visualization, automated management of learning plans, and efficient evaluation and review [7]. For example, Letrus is an AI-based literacy program implemented in middle and high schools across Brazil, which combines AI's natural language processing technology to provide timely feedback in students' reading and writing, helping to narrow the literacy gap between students [5]. Large Language Models (LLMs) play a significant role in teaching daily routines and repetitive administrative tasks, effectively enhancing teaching potential and improving efficiency through automation. For instance, they can be used to design learning products to assist teaching, develop educational resources, and electronic scoring devices, among others [8]. The World Economic Forum predicts that up to 20% of administrative tasks in education can be automated, enabling teachers to concentrate on developing critical thinking and creativity [5].

2.2. Promoting personalized learning

Traditional teaching models have numerous limitations. In terms of educational objectives, mere knowledge transfer does not equate to the cultivation of abilities. Under this educational paradigm,

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students often engage in passive learning and rote memorization, which can lead to a lack of innovation and critical thinking skills. Educational content also tends to focus primarily on textbooks, with limited expansion, making it difficult to stimulate students' curiosity for exploration. Education is targeted at all students without considering their circumstances, which may result in uneven outcomes [9]. Non-personalized learning is one of the greatest challenges facing the field of education. For example, different students have varying degrees of development in their left and right hemispheres, leading to different processes in acquiring knowledge. Alternatively, some special students may need to overcome certain challenges during their learning, which can also impact their learning outcomes. The emergence of new tools such as AI has broken with tradition and propelled the development of educational methods that emphasize personalized learning. The shift from traditional teaching methods to highly personalized teaching philosophies is pivotal to educational progress.

In modern education driven by technology, personalized learning can be achieved by customizing personalized learning plans, allowing students to learn at a pace that suits them, which can help improve learning levels. This unique model will also adopt personalized tutoring to provide more targeted solutions to students' problems, thereby improving learning efficiency. Personalized learning is usually not limited to books, but tends to provide a wider range of knowledge and information based on students' preferences and reading habits. For example, the artificial intelligence digital textbook program introduced by the South Korean Ministry of Education in 2025 can provide personalized customization for students with different levels of proficiency [5]. This helps to broaden students' thinking, tap into their exploratory desires, and promote the formation of critical thinking. Personalized education can improve student performance by tailoring learning methods to suit individual students, such as personalized tutoring, personalized course plans, and personalized homework. One study on the effectiveness of personalized learning shows that personalized learning has a significant positive impact on student learning outcomes [10].

2.3. Facilitating the development of inclusive education

Through artificial intelligence technology, inclusive education is developing faster. The initial purpose of inclusive education was to provide students with special educational needs with access to mainstream education. Later on, it gradually evolved into an educational philosophy based on fairness and inclusiveness, with the core of providing equal teaching opportunities for all learners. Regardless of any special physical or psychological needs of students, they should receive equal education. The emergence of artificial intelligence technology has had many positive impacts on inclusive education. For example, multilingual learners can overcome language barriers through AI translation tools and practice conversations through AI chat software to enhance their multilingual communication skills. In addition, augmented reality (AR) and speech recognition technology can help disabled students more easily grasp learning materials. For example, accessible digital textbooks that combine universal learning plan principles with accessible technology. It aims to meet the needs of different learners, including students with disabilities [5]. Blind students can use AI to explain and visit art galleries, museums, etc. It allows them to equally experience the charm of cultural knowledge. The characteristics of AI enable it to provide high-quality data analysis, which can effectively monitor the learning situation of special students and facilitate personalized guidance for students. As mentioned earlier, AI can alleviate the daily administrative burden on teachers, allowing them to have more time to focus on other teaching areas such as emotional support, emotional sorting, appropriate encouragement, and creativity maintenance for students. These AI-driven modern technological means can effectively support the education of special needs children.

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3. Challenges of AI in education

Although AI has brought many benefits to education and teaching, it has created many new opportunities for development. However, there are also some challenges and risks. Firstly, AI bias is an important challenge, and if not regulated and improved, it may lead to significant social problems. Secondly, the application of AI in teaching may lead to the marginalization of teachers' roles, and research shows that AI has advantages over teachers in multiple aspects. Finally, students' excessive dependence on AI has become a problem, which may seriously affect their future development.

3.1. AI bias

AI bias is a key challenge for people's increasing reliance on AI technology. AI bias may lead to inequality or fixed stereotypes, which in turn can trigger some social problems. AI bias mainly refers to the one-sided tendency of artificial intelligence systems in the process of analyzing, making decisions, or obtaining results due to data bias, algorithm bias, gender bias, cultural bias, and economic bias. For example, if there are stereotypes such as gender in the data. AI will amplify these biases during the analysis process, leading to erroneous tendencies in the data. Due to the deep integration of digital technologies such as AI into people's lives, if this issue is not taken seriously, many problems may arise. In addition, AI chatbots are the most closely related to people's daily lives. If AI dialogue robots have some fixed stereotypes, it is likely to affect the development of users' concepts. In the context of AI deepening into the field of education, this dialogue robot is also the most commonly used by students and teachers. If AI bias exists, it may lead to incorrect or stereotypical results. Regardless of the situation, it will seriously affect the development of students' future education. Once some fixed stereotypes are formed in education, it will seriously harm students' thinking patterns and may trigger a talent crisis. These examples all indicate that if AI bias is not taken seriously, it is likely to have a greater negative impact, leading to a crisis of trust in AI among people. Even influencing the development of overall social concepts.

3.2. Marginalization of teachers

With the continuous deepening of AI in teaching, it may lead to the marginalization of teachers. "Will teachers be replaced?" has become a hot topic. Under the traditional education model, teaching is mostly limited to traditional classrooms in schools [9]. However, the emergence of AI has broken this traditional model. AI technology can provide students with large-scale open course spaces and many high-quality online resources. This seems to be a more efficient and diverse way for students to acquire knowledge through online resources, which endangers traditional classroom culture. In traditional education, teachers usually have absolute authority and occupy a dominant position [9]. The status of teachers and students is unequal, as teachers are the "leaders of knowledge" in the classroom, and students only need to listen and memorize without paying actual costs [9]. However, the development of AI and the Internet has broken this situation and gradually formed an equal relationship of "teacher-centered" and "student-centered" coexistence [11]. Due to teachers are no longer "monopolists of knowledge". Students can obtain more information and materials through AI, and their knowledge reserves in some areas may exceed those of teachers. In this situation, the role of teachers continues to be marginalized. In addition, AI can not only serve as a database for students, but also act as a conversational partner for interacting with them. Based on the efficient processing of large amounts of information by AI. AI can analyze students' daily data, communicate

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with them, and support their learning and improvement. Students' time using AI is autonomous, while their time for communicating with teachers is limited. This may mean that students may have more communication with AI, and AI can also gain a better understanding of students through data analysis. In this case, the teacher's responsibilities are being replaced. Therefore, whether teachers can survive in the increasingly developing era is an important question.

3.3. Excessive dependence of students

The gradual popularization of AI in education and its strong accessibility for students will raise concerns about excessive dependence on AI. Students' excessive dependence on AI may lead to a lack of personal thinking. Even if AI generates incorrect answers, students will still accept them without hesitation. This will lead to a lack of critical thinking skills, a key area of personal development [12]. There is research that suggests the reason for this phenomenon may be due to competitive pressure among classmates [12]. In traditional education, exam scores are usually used as the standard of measurement [9]. Students' emphasis on grades and rankings may lead to competition among them. Completing assignments and exams excellently has become the expectation of students, and AI can easily help them complete them. This may lead to some students becoming overly dependent on AI. It is difficult to determine whether students benefit from AI or blindly follow the answers generated by AI. Owing to there is currently no means to check whether students have truly read the content generated by AI [3]. Moreover, excessive reliance on AI has a significant negative impact on students [12]. Once students become overly dependent on AI, over time, it not only affects their learning but also causes difficulties in their daily lives. For example, students' excessive dependence on AI can lead to a lack of problem-solving ability, independent thinking ability, critical thinking, and innovation ability. However, these abilities are key elements for students' personal development, and their lack may affect their future development. In addition, excessive reliance on AI may lead to a lack of some social skills. For example, the language dialogue function of AI can satisfy students' daily communication and exploration desires, and excessive dependence may hinder normal social communication skills. Long-term lack of practical communication, failure to personally integrate into society, and failure to interact with new people and things. These can lead to students lacking efficient communication skills, rich social experience, interpersonal skills, and emotional intelligence. The lack of these internal abilities can also affect a person's future development.

4. The future of AI in education

AI is a double-edged sword. The use of AI in education has both advantages and disadvantages, and only by finding a balance point can it maximize its benefits. AI is an emerging field, and the incomplete regulatory and personal behavior norms may lead to the development of the above-mentioned risks. If the regulatory system is reasonable and efficient, individual behavior norms are followed. It can maximize the effectiveness of AI.

4.1. Regulation and intervention

Research has shown that there have been many attempts by various parties to address AI bias and achieve fairness [13]. Although the solutions to AI bias vary in different AI fields, there are generally three main types of solutions to address AI bias. It mainly involves pre-processing techniques, modifications during processing, and post-processing improvements [13]. However,

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these three types of solutions cannot be without the intervention and management of regulatory authorities. Regulatory authorities can ensure the transparency of AI algorithm processes and the effectiveness of results by real-time monitoring to ensure that there is no bias in the algorithm process. In addition, regulatory authorities can also establish specialized AI teams through an in-depth understanding of AI, continuously exploring effective testing methods and evaluation systems. This can effectively improve the regulatory gap in the AI field. Moreover, the problem of excessive dependence on students can be addressed through teacher intervention. The excessive dependence of students on AI is due to a lack of understanding and insufficient discernment ability towards AI. Teachers can communicate with students about the process of thinking about homework after they have completed it, to ensure that students have their independent thinking. Simultaneously, some AI-themed seminars and class meetings can be added to the course plan. Enable students to have a clear understanding of AI and the boundaries of AI ethical standards.

4.2. Personal code of conduct

Apart from supervision and intervention from relevant departments and personnel, individual behavioral constraints are also important. Both teacher marginalization and students' excessive reliance on AI can be addressed by strengthening their own behavioral norms. Teachers are the core of teaching. Only by continuously learning and improving their mastery of emerging technologies such as AI can teachers maintain their core position. Teachers can make full use of emerging technologies such as AI. By accessing a variety of rich online resources, enhancing personal teaching abilities, and expanding knowledge reserves, one to better optimize teaching quality. Teachers can also participate in AI-themed training activities to master AI by learning professional knowledge. This can enable teachers to maximize the effectiveness of AI for their use. These strategies help to address the issue of teacher marginalization, making AI an efficient tool for teachers rather than a substitute. In addition, it is also important for students to have a sense of restraint in their use of AI. For example, students need to comply with AI ethical standards after taking AI-related courses. After understanding the consequences of excessive dependence on AI, develop a good habit of not relying on AI on their own. During the learning process, students should seek more independent thinking on their own. In the process of using AI, students need to retain their judgment ability and can expand their thinking based on the ideas provided by AI. These methods all contribute to the formation of personal awareness of standardized use of AI, thereby reducing the risk of students' excessive dependence on AI.

5. Conclusion

Against the backdrop of the flourishing of AI and its rapid expansion into the field of education. This study found that the use of AI can have both positive and negative impacts on educational development.

The potential of AI in education is enormous. Compared to traditional teaching methods, AI can bring many emerging technologies to assist teaching and learning. This can not only optimize the teaching process but also improve the quality of teaching, thereby enhancing the teaching and evaluation efficiency of teachers. In addition, it is also of great help to students. AI, with its powerful data processing capabilities, can bring students more knowledge resources and expand their thinking.

This study also found that with the deepening of AI in education, it will bring many risks. Not supervising the AI process can lead to AI bias, which can affect the development of educators' and

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learners' perspectives. If teachers cannot become controllers of AI and do not pursue self-regulation and development, it will lead to continuous marginalization of teachers. In addition, students should also pay attention to the problem of excessive dependence on AI.

This study seeks a balance point for development through a cost-benefit analysis, which helps to supplement current research on AI and education. At the same time, this study focuses on a new area of concern - the concept of inclusive education, which helps to expand the research ideas in the field. Future development can be analyzed in depth based on the feasibility of the recommendations proposed in this study, examining whether there is a balance point that maximizes the development advantages of AI in the field of education.

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