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The Role of Education in the Era of AI: Challenges Along with Opportunities

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Abstract

This work examines how AI is transforming education in the face of the field's rapid advancements. It explores how AI is changing learning environments by allowing for personalized learning and resolving inequalities in the distribution of educational resources. The review raises ethical questions and worries about AI-caused unemployment, but it also highlights how AI has the potential to democratize education by lowering costs and dismantling conventional barriers. It also discusses the difficulties in incorporating AI into educational environments, specifically the potential digital divide and ethical issues. The use of AI by governments to promote educational reform and enhance learning opportunity equity is also examined in this paper. In the end, it offers a complex picture of how AI will influence upcoming paradigms in education and possible societal effects.

Keywords

Artificial Intelligence in Education, AI Ethics, Educational Policy, AI and Unemployment, Government Role in Education

1. Introduction

1.1 Overview of AI's prominence in 2023 and its widespread adoption across various sectors

2023 is the Birth Year of Artificial Intelligence. This is not to say that artificial intelligence originated in this year, but rather that it had widespread usage at the moment. The size of the worldwide market is growing at a very exponential rate. The market for artificial intelligence was estimated to be worth $136.6 billion globally in 2022 and is likely to grow rapidly at a compound annual growth rate (CAGR) of 38.0% from 2021 to 2030, when it is expected to reach $1,811.8 billion (Artificial Intelligence Market Size, Share & Trends Analysis Report). AI is used in about 77% of sectors. Out of these, 35% have already used AI to increase productivity, accuracy, and efficiency, and 42% are looking into methods to incorporate AI into their day-to-day activities.

Education is one of the fields that has been used as a focal point for a thorough exploration of this trend. AI is frequently utilized to create personalized learning strategies for students. By analyzing data such as academic performance, interests, and preferences, the educational process can be tailored to suit each student's needs and learning style, supporting proactive interventions to enhance student outcomes. Significantly, equipped with cutting-edge data analysis tools, improving research capacities, and empowering people to make informed choices and predict future trends, is now no longer only the privilege of educators and academics. It is like Midjourney that can help you finish your masterpiece even if you haven't utilized any design tools—all you have to do is be innovative (Nitin, 2023). This review examines the current state of education, the ways in which AI is changing educational paradigms, and what that means for the next generation.

2. Societal Impact of AI Development

2.1 Concerns about unemployment, ethical dilemmas, and resistance to AI

However, another interesting but concerning piece of information is that by 2025, artificial intelligence (AI) and other automation technologies may replace 85 million jobs globally. By 2030, it is estimated that 375 million people will have reluctantly changed their jobs as a result of these technological advancements. To put it plainly, there has been an abundance of "catastrophes" that have occurred around you and me. For instance, ChatGPT, a leader in the AI space, recently introduced "explore," which enables non-programmers to design and publish apps. Similarly, while Adobe's AI video editing system Firefly's text effects tool converts text into artwork, providing designers with an abundance of creative options and time-saving advantages, the extensive use of AI across not only the design business but also a range of industries may result in rising unemployment, income inequality, and a potential breakdown of the social order (ProCon.org, 2023).

From an educational perspective, the debates sparked by AI advancement will also be easier to understand, especially when it comes to moral issues. AI is expected to have either an adverse or very unfavorable influence on teaching and learning in the next five years, according to nearly half of the educators surveyed by EdWeek Research Center (Langreo, 2023). Over 40% of teenagers said they would probably employ AI in their schooling, according to a Big Village for Junior Achievement poll. However, 60% of respondents said that they thought it was unethical to use AI for academic purposes. According to Jack E. Kosakowski, president and CEO of Junior Achievement USA, using AI inappropriately for assignments could hinder children' education because they will not acquire the skills that AI is meant to teach them (Lauraine, 2023). Therefore, given concerns about cheating and data privacy, some universities throughout the globe—such as the University of Sydney—have prohibited AI technologies on campus. The restriction on AI has gotten so severe that some foreign students whose first language is not English compose papers with the assistance of Google Translate, which is regarded as "academic immorality".

3. Current State and Selectivity of Education

3.1 The limitations and political-economic influences on the education system

Uber, a business that was once targeted by multiple governments, is a significant player in the ride-hailing and taxi industries, accounting for 72% of the global ride-hailing market as of 2023. Uber would not exist today if the taxi industry could have satisfied its passengers. The education system of today is seen as kind of a holdover from the 20th century, even though, in its comfort zone, it believes itself to be more advanced than it was in the decades prior.

As to the last century, education is used by powerful people in many states as a tool. Governments always choose historical material that is useful to their development when writing history textbooks, and identically is true of education. The way disciplines are resourced, and the way education is implemented always serve as a breeding ground for the types of "nourishment" that governments and consortiums require. For example, if a potentate seeks to cultivate a large number of blue-collar workers to work on social infrastructure, they can put pressure on the education department to encourage more young people to enroll in vocational schools, and there will be an increase in the rate at which applicants are turned away from colleges. Secondly, some special interests may additionally offer large subsidies in order to entice more applicants to seek employment in this field. While it's true that certain governments have made every effort to counteract this issue, high tuition fees are also an accomplice of these interest groups. An average of 21.1 years was found to be required to pay off student loan debt, based on a One Wisconsin Institute poll with 61,000 participants (Matt, 2021). This means that, in addition to studying based on their own interests and goals, students should also be considering whether or not their chosen career path will shorten the time it takes to pay back their student loans. In this situation, their career goals might need them to select fields more suited to the requirements of interest groups. The system around education is a nasty one that never ends.

4. Potential of AI in Education

4.1 Exploration of how AI can revolutionize education

Education should not serve the wealthy but rather provide as many diverse possibilities as possible for all individuals. This kind of selection focuses more on "what I cannot do" than it does on "what I can do". Taking one of above data as a sample to discuss deeply, the Income-based Repayment (IBR) Plan of the Federal Student Loan Program in the

United States lasts for 25 years. In this scenario, a student who takes out a loan to attend college must, in part, select a course of study that will facilitate the loan's monthly repayment. The length of the repayment cycle raises the likelihood that the borrowers will not be able to pay for another costly advanced education for the upcoming generation. As a result, the following generation will likewise be "compelled" to keep falling into this financial wasteland. They are stuck in this kind of whirlpool with no true way out. Nevertheless, the issue remains: Does education make people become entangled in this web? Assuming that professionals in some fields, such as product managers, accountants, attorneys, and so on, could still obtain their current roles without pursuing advanced degree courses? Another assumption is that people could be able to appreciate the selection that comes with knowledge and education more fully if tuition were only a tenth or even less than what it is now.

At present, it seems like everything is blamed on the tuition. But may the advancement and ubiquity of artificial intelligence cut tuition fees by plunging the prices of schools and universities to an all-time low? An additional set of data is provided. Operating expenses such as teaching, administration, research, libraries, dormitories, cafeterias, and other services for students or faculty accounted for 89% of spending in higher education in 2020. The remaining 11% was set aside for capital expenses like construction and maintenance (US Bureau of the Census, Survey of State and Local Government Finance, 1977-2020). When artificial intelligence became a "battlefield" a few years ago, everyone speculated that blue-collar workers would be "slaughtered," with robots taking the place of human labor in construction and healthcare, for example. However, in fact, judging from the current development direction and market data, the field that has been "nuked" is neither blue-collar nor professional fields (such as positions that can provide scientific research and AI training), but between each other. In other words, tuition fees may not be crippled under such a development. Consider things differently, even though a company's fixed expenses cannot decrease quickly, the CEO can consider it in terms of turnover as modern artificial intelligence is already capable of offering this opportunity.

The current state of the market makes it clear that lowering the entrance barrier for each professional field is the best course for the popularization of AI. For instance, a number of products like Mubert, Synthesizer V, and Endel are available on the market and enable amateurs to compose music. The intended audience consists of genuine amateurs, not experts in a particular area, like composition, who do not make a living from their musical endeavors. This initiative is already unexpected. Referring back to the earlier hypothesis, the prospective college student who is bothered about his future means of support and repayment schedule can boldly embrace his interest as the big premises when it comes to selecting a subject. They can choose from a variety of side occupations, not just one, in the event that their majors are not supported by the labor market after graduation to pay for living expenses and bank loans. For AI boosts output geometrically while also significantly destroying the industries' barrier. All is fair at the same moment. This means that psychology graduates are free to pursue short-form video streaming, creative ingenuity, and music composition concurrently. Additionally, students in the music department can utilize artificial intelligence to help them combine their respective fields of expertise to create a song that helps alleviate depression symptoms.

In order to address fairness more effectively, it is important to consider how educational resources are distributed. This distribution considers both regional differences and class equalization. The strong desire of most talented people is to work in larger cities when circumstances allow. China sent 2.98 billion travelers throughout the nation during the 2019 Spring Festival travel season, according to data from the National Development and Reform Commission. Even though it is impossible to pinpoint the precise amount of population movement, this number—which shows the cumulative total of travel events over a 40-day period—is sufficient to demonstrate the overwhelming majority of people's preference to live in more developed cities. In this case, minor cities and outlying places will undoubtedly receive considerably less resources for education than major cities. Furthermore, children from different social levels receive unequal schooling, even within the same city. These distributional imbalances have a direct impact on a number of factors, such as the cost of educational supplies, the lack of resources for teachers, which may force one teacher to teach a class of students that is too large for them, and the caliber of the teacher—faculty staff with advanced degrees and rich expertise are more likely to work in metropolitan areas, and unquestionably, the majority of teachers tend to hold educational roles with more generous pay. AI might be able to address this unfairness. Teachers in rural areas can employ robots to innovate in the face of limited space in small cities to build high-quality educational environments, from the perspective of ‘usable conditions’ that have now been mature. Using the teaching of English as an example, the full-English atmosphere is crucial. Teachers can create an immersive language environment for their pupils during or after class by utilizing AI. In this zone, AI will assume not only the roles of several NPCs and even tutors, but can also be an analyst of each student's academic performance. The teacher acts as the

planner and CPU of the entire system, based on the performance of AI and each student's level, training, and improving system. It is unfounded to fear that secondary urban or regular colleges' teachers lack the exceptional academic credentials of top-tier international institutions, for the robust computing power of AI can close this disparity. AI offers educational chances to learners as they study. Since ChatGPT has created an environment in which educators without programming experience may design apps, there is no longer any reason to be concerned about teachers lacking skills in programming.

There is an unbreakable relationship between rising selectivity and increasing opportunities. It is important for people to realize what they are incapable of doing. This "what" is not one or two, but rather multiple. SpaceX creator Elon Musk has set up a school for his key staff members. In contrast to traditional schooling, the goal is to encourage children's potential. In private schools in Britain, a single student is taught by numerous teachers, who are driven to provide a deep education while honoring the student's interests. While you are not required to select such a prestigious education, you cannot be denied admission on account of tuition. This issue might be resolved using Khan Academic's AI learning tool, Khanmingo. Personalized guidance in several areas can be given to learners by it, considering their learning objectives, present proficiency, and advancement. For instance, Khanmingo will walk students through the process of exploring and discovering instead of immediately pointing out a mistake in a math question's answer. In terms of literature and history, students can engage in discussions with pertinent historical personalities or authors of the events and immerse themselves in matching historical events. Sal Khan, founder of Khan Academic, gave an example in his TED speech. One girl discovered that Gatsby liked to stare at the green light all the time when reading "The Great Gatsby." She desires to know why Gatsby acts in this way. Additionally, she used Khanmingo to initiate communication with Gatsby directly. In a paper by Rebecca Lazarides and Johann Chevalère (2021), a similar situation is also described. It states that teachers can focus on students with specific needs and let students learn at their own pace by using Intelligent Tutoring Systems (ITS) and other AI-driven methods for personalizing education. While AI may not be able to completely eliminate the cost of elite and degree-based higher education at this time, it can provide students with more options in terms of how knowledge is imparted.

Frankly speaking, it is difficult to predict how artificial intelligence will evolve next in education. With the rapid development speed, human beings can not only realize a completely personalized education path and achieve global education equalization, in the not-too-distant future, 10 years, or just 5 years, but also have a foot in human-machine Interface learning -- AI directly transfers knowledge and skills to the human brain through brain-computer interface, and virtual reality world learning environment -- students can conduct interactive learning in a complete virtual world, experience different historical periods and explore different galaxies.

5. Future Skill Needs and Equity, Ethical, Privacy Concerns

5.1 The evolving demand for new skills, and Fair and ethical considerations in implementing AI in education

Before the next chapter, a variety of obstacles must be overcome. One of these is the technical challenges associated with developing brain-computer interfaces, particularly those related to security and dependability. After all, the advancements of the coming era will enable students to explore the virtual world, not merely use VR glasses to play games as they do now. Algorithms must simultaneously be able to adapt and accurately grasp each learner's unique needs, and they must have a super brain to examine and consider each learner's emotional problems. But none of the aforementioned are the main challenges.

Emilio Ferrara (2023) stated that The Butterfly Effect, a theory derived from chaos theory, "underlines how small changes can have significant and unpredictable impacts on complex systems". He concerned about how small biases or changes in AI systems can lead to significant unfair outcomes, particularly affecting marginalized groups, "these seemingly minor alterations can lead to unexpected and substantial unfair outcomes, disproportionately affecting underrepresented individuals or groups and perpetuating pre-existing inequalities."

The use of AI in education can not only improve learning effectiveness and augment human intelligence during the learning process, but it can also raise potential ethical issues such as digital hegemony in education, power relationships between learners, teachers, and AI systems, and the digital divide (Buckingham & Luckin, 2019). According to Fernando Filgueiras (2023), algorithmic biases come from the architecture of artificial intelligence technology, in which robots make inaccurate conclusions due to learning processes with inconsistent data or incorrect supervision (Eubanks, 2018; Noble, 2018). Furthermore, the tyranny of numbers, which may be expedited and increased by

artificial intelligence, is unaware of a more compassionate method based on a social justice perspective (Ball, 2015). For instance, the United Kingdom's attempt to automatically assign students to colleges during the pandemic by replacing the A-level grade with an algorithmic approach failed because it perpetuated inequalities related to race, gender, and ethnic origin.

Matti Tedre (2021) examined the difficulties associated with integrating machine learning (ML) into K-12 teaching. One of the main issues is that these "black-boxed" elements—a process or part of a system that is opaque or not transparent to the user or learner—require trade-offs that are not universally agreed upon. He said that exposing kids to these enigmatic processes could result in their developing conceptual models of ML systems that are either erroneous or excessively simplistic. Once created, these simplified understandings might be difficult to revise or update.

5.2 The Challenges of Governments in Reform

One significant turning point in human history was the Industrial Revolution. Massive mechanized manufacturing caused people to move from rural to urban areas, creating a new working class. In addition to fostering globalization, because nations had to search for raw materials and new markets, it also intensified the spread of colonialism and extensive exploitation, which led to environmental pollution, and it brought about unprecedented economic growth, which worsened the gap between the rich and the poor and the exploitation of the working class. Fortunately, governments have realized the severity of these issues and have responded by enacting a number of reforms, such as labor laws and health and safety standards, to safeguard the exploited working class—particularly women and children—and significantly improve their working conditions. At the same time, they have started to prioritize education as a means of increasing employment prospects and standard of living. This series of measures guarantees sustainability and pragmatism in development.

The next revolution is now under way and the governments are dealing with more pressing issues than during the Industrial Revolution. The working class protested during the Industrial Revolution, claiming that their jobs were being lost to mass production. In a few years, the democratization of AI may cause the vested interests and privileged class of the past, including big businesses and deeply ingrained educational institutions, to become the protestors of today. Ordinary people have experienced "liberation" as a result of this evolution, but there is also a chance of an unprecedented "economic avalanche." This review underscores the transformative role of AI in education and sets the stage for further research on government policies to harness its potential.

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