

Ethical Risks in Integrating Artificial Intelligence into Education and Potential Countermeasures

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A developing trend is the integration of artificial intelligence (AI) into education. As a result of the widespread adoption of educational AI, the ethical risks it poses have raised growing public concern. The use of educational AI poses three key ethical risks: the risk of educational data security; the risk of deconstructing the teacher-student role structure and educational inequality; and the risk of alienation from educational goals. We herein advocate as countermeasures the redefinition of teachers' fundamental duties, the instruction of students in the sensible use of AI, and the promotion of effective regulation of AI's deployment in education.

Keywords: Artificial Intelligence; Ethical Risks; Countermeasure; Educational AI

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IN the 1950s, the term “artificial intelligence” (AI) was first used in the United States. Not until 2016, when the AI Go chess software AlphaGo defeated the human Go chess champion, did the world begin to focus on this technology. AI is a discipline of computer science that seeks to comprehend the essence of intelligence and develop a new class of intelligent robots capable of responding in a manner analogous to human intelligence. Currently, the trend of integrating AI more deeply into education is increasing, and several intelligent apps have been developed. Nonetheless, potential comes with hazards, as Professor Tang explains: “The deep integration of artificial intelligence into education may alter our prior understanding of education, causing us to be puzzled and concerned” (1). The blind pursuit of technology may lead to alienation from “human-centered education,” while opposing the use of technology would also impede social progress. The indeterminacy as to whether technology and education will serve the common good poses ethical concerns (2). Identifying and mitigating the ethical

hazards associated with the application of AI in education has become a key concern of academia.

The Application of Artificial Intelligence in Education

With the incorporation of AI, the educational setting has shifted from a real-world-based learning environment to a hybrid of reality and virtuality, and traditional teaching activities have been modified. We define it as the integration of AI technology into educational advancement as a means of accomplishing the objective of increasing educational outcomes (3). In other words, the objective of implementing AI in education is to “assist,” specifically in learning, teaching, and administration (4).

Assistance in Learning

Prior to the usage of educational AI, students mostly gained knowledge from books and teacher instruction, which is extremely limited. As a result of social progress, individuals, espe-

cially students, require more extensive development. Not only can AI technology expand learning content, but it can also tailor learning to the needs of each individual. With the help of the adaptive learning system, AI can assist students in planning each step of the learning process, such as pre-class preparation, searching for learning materials, etc.; it can provide personalized tutoring based on an individual's preferences; learners with visual or hearing impairments can perform text input or output operations using voice converters (5); AI facilitates distance education, removing the limitations of space and diversity; and AI is a key component of the future of education.

Assistance in Teaching

In the era of AI, big data improves the precision and focus of teachers' educational strategies. From group education to precise teaching, from homogeneous teaching materials to individualized content, and from a rigid process to a high level of autonomy, AI-assisted instruction enables the transition from group education to precise teaching (6). A smart classroom is not complete without a smart blackboard. With its powerful touch screen and multimedia capabilities, the blackboard allows teachers to freely write, erase, and even play audio and video. The smart blackboard's projection function can also display the students' learning results in real time, facilitating classroom interaction and boosting the students' sense of engagement (7).

For the prevention and control of the COVID-19 pandemic, online instruction has unquestionably become the best choice, but it also places additional demands on classroom management. As in traditional classrooms, it is impossible for teachers to monitor student learning beyond the computer screen. Fortunately, facial recognition technology can assist teachers in determining if students are attentive and able to comprehend the lesson material based on the expressions exhibited on the screen (5). Speech recognition technology can automatically produce subtitles for online classrooms, reducing comprehension errors caused by unstable signal transmission; the AI camera technology helps to record the entire classroom process, facilitating teachers' reflection and revision after class; and teachers can be relieved of repetitive work in marking students' homework, thereby improving their work efficiency significantly. AI can even assist teachers in identifying instances of plagiarized coursework.

Assistance in School Administration

The entire process of school administration can be injected with AI technology. The all-in-one card encompasses all areas of campus life, including fee payment, book borrowing, and identity verification. At the level of the class, the use of smart class cards provides teachers with rapid insight into classroom activities and student learning situations. With the intelligent home-school contact application, parents can monitor their children's school activities at any time and place, as well as respond promptly to school enquiries (8). With the assistance of big data, teachers and instructional resources can be assigned properly, and school administration can be more precise, which significantly enhances the overall quality of school education (4).

Ethical Risks Associated with the Integration

of Artificial Intelligence in Education and Their Root Causes

The examination of AI's ethical challenges cannot be separated from its subjects, i.e., humans. Regarding educational AI, the majority of scholars concentrate on its effects on key stakeholders. The ethics of educational AI refers to the moral limitations and behavioral rules that developers and users of AI in education must observe.

According to the evolution of production tools, the history of human civilization can be split into four periods: the Stone Age, the Metal Age, the Great Machine Age, and the Robot Age. Information and Internet technology are the most emblematic technologies of the Robot Age, in which AI is a vital aspect. The rapid growth of AI will not only result in changes to social relationships but also societal and ethical concerns (9). The use of AI in education has increased the breadth and depth of information flow. However, if the development of AI focuses solely on the efficacy of practical outcomes and disregards its role in educating people, ethical concerns would compromise its overall effectiveness.

Ethical Risks to Educational Data Security

The application of AI is typically founded on the collection of massive amounts of data. Data is the physical manifestation of information that can reflect user characteristics such as identity and personal habits. People relied on statistical methods to acquire data during the infancy of computers, and the creation of databases indicated that people began to manage data. People are attempting to analyze and benefit from data as a result of the ubiquity of mobile devices such as smart phones, which has made the collection of data easier and more cost-effective. The usage of data at these two stages has generated ethical concerns, including security threats. Consequently, we will need to manage data with greater care in the future (10).

Data security is the process of protecting data throughout its lifecycle from unauthorized access, corruption, and theft (11). In general, developers of AI applications in educational AI obtain data from the intended users, i.e., teachers and students (10). There may be ethical hazards associated with educational data security at the following stages: (i) The stages of data creation and collection: Prior to utilizing AI applications, users are frequently required to agree to a contract granting the application access to personal information or to check a privacy-related box. These procedures provide developers with avenues for data collection. (ii) Phases of data exploitation and commercialization. Typically, developers acquire data under the guise of providing users with more tailored services and make relevant inferences based on the users' individual interests and behaviors. At this point, users are examined and monitored as objects. The developer will then "push" appropriate material to users based on the estimation results, or directly "sell" user data to relevant firms. Users may get dependent on the push of big data and lose the desire to make independent decisions over time (12).

Profit-seeking is inherent to business, which explains why AI application developers risk violating the security of teachers' and kids' data. Despite the fact that the Measures for the Regulation of Educational Data of the Organizations of the Ministry of Education and Directly Affiliated Institutions have played a

regulatory role to some extent, the current state of educational data security indicates that such ethical risks cannot be eliminated easily. The protection of educational data requires a permanent, institutionalized safeguard (11).

The Ethical Risks of Deconstructing Teacher-Student Role Structure

In the traditional educational environment, teachers serve as educators. The emergence of AI has recreated the traditional education ecosystem, and a portion of instructors' duties have been moved to AI. The role of educators is undergoing a significant transformation (13). Some scholars describe AI that functions similarly to educators as "human-like AI." Thus, "human-like AI" is introduced to the usual teacher-student relationship. In the conventional ecology of education, the relationship between teachers and students is that of educators and educatees, while technology serves as a supplemental tool. As AI technology develops, it is possible that "human-like AI" will destroy this relationship.

Obscuring the Role of Educators

As a result of the integration of AI into education, teaching can be a collaborative effort between teachers and AI. On the one hand, such collaboration may assist teachers by lowering the number of easy and repetitive tasks they are required to complete, allowing them to dedicate more time and effort to activities of greater instructional value. On the other hand, AI has the ability to do more complex educational tasks in the future. In this situation, concerns such as "whether such 'human-like AI' is capable of making correct moral or value-related judgments," "whether they will entirely replace teachers," and "if they will attempt to understand learners deliberately" remain unanswered. If the emergence of AI alters the role of educators, the traditional ethics of education will be put to the test.

Impeding the healthy development of Educatees

AI technology provides students with a virtual learning environment and facilitates their self-augmentation. Consequently, the learner may build a network-based virtual personality that is distinct from their actual personality. Among the unwelcome outcomes of excessive AI use for students are:

Extravagant Entertainment Experience

Students are especially intrigued by the educational AI's engaging teaching approaches, which can alleviate their cognitive load and make them feel as though learning can also be relaxing and enjoyable. Nevertheless, effective learning demands a large amount of cognitive input. In order to process complicated information, the brain must be intensely focused, but distractions at this stage diminish student learning quality. For instance, digital AI textbooks typically contain several images and videos, which are more likely to engage students and disturb their ability to think coherently. As a result, students may lose focus on the learning objectives and overlook the most important parts. The main harmful implications of the entertaining learning method are the likelihood of students becoming dependent on fragmented digital information and the loss of their capacity for

in-depth thought.

Inadequate Socialization

Long-term human-computer interactive learning will deprive students of time for face-to-face communication with their peers and the chance to experience the educational environment in person. This will have a negative effect on the mental health and social skills of students (13).

Biased Information Intake

A widely accepted advantage of educational AI is its capacity to provide learners with individualized instructional materials. However, a deeper examination of this benefit's underlying cause may lead to a different viewpoint. Big data is used by AI to profile students and determine their preferences. Over time, the information cocoons gradually form, supplying the learner with homogeneous data; each learner becomes predictable and controllable. In the end, an irrational reliance on AI will inhibit the individualization of student growth (12).

Ethical Risks to Educational Equity

Educational resources of superior quality have always been scarce. On the one hand, a number of AI applications, such as adaptive learning platforms, have broadened the routes to knowledge acquisition, eliminated the spatial limitation of educational opportunities, and facilitated the universalization of intelligent education. On the other hand, AI applications rely on clever machines, which are typically only affordable to the privileged elite. The disparity in access to cutting-edge technologies will result in a new form of educational inequality. The uneven distribution of intelligent educational resources between nations and the restriction of data sharing between platforms aggravate regional disparities in education (14). In addition, some online educational materials of high quality charge substantial amounts; paid knowledge has become a trend (15).

The provision of discriminatory data by AI applications is also a cause of educational inequality. The application of AI is a process consisting of prescribed processes such as data entry, algorithm processing, and data output (16). Therefore, the insertion of discriminating data will undoubtedly result in skewed outcomes. In 2016, for example, a test using graphic recognition software in the United States determined that kitchens are associated with women whereas keyboards are associated with men. Discriminatory information is added to databases, and then these inherent biases are transmitted to students through AI-based instructional models (10). Long-term exposure to instructional AI will unavoidably alter the values of students because discriminatory attitudes collide with the supposed beneficial values of education (14). Consequently, there are ethical dangers to unequal outcomes associated with the use of educational AI.

Ethical Risks of Alienation from Educational Goals

The primary goal of education is to encourage the all-around development of individuals, which includes growth in skills, virtue, and physical fitness. Human development as a whole is the product of free and spontaneous behaviors, but AI based on large amounts of data may inhibit free development. Big data

can contribute to projecting an individual's future development and career prospects, but nevertheless, it is possible that the forecasts will limit their options and restrict their freedom of choice. Guoping Zhou, a fellow researcher at the Chinese Academy of Social Sciences, feels that people who are overly dependent on AI technology and renounce the joy inherent in autonomous learning may lose the ability to self-education and become foolish (17).

Two decades ago, the Chinese Ministry of Education recommended the educational objective of student emotion and attitude development, which was considered a vital aspect of students' all-around growth. Emotions are more likely than knowledge to assist learners to comprehend the significance of being human and then engage actively in learning (18). The role of teachers in education defines that they are the source of emotions in educational activities and are vital to the development of students' emotional skills (19). As a result of the incorporation of AI into education, teachers become less engaged in educational activities, or teachers and students must converse via computer screens. Such a change will impede teacher-student emotional communication and create an "emotional barrier," i.e., the emotional connection between teachers and students will be diminished by technology (18).

Do contemporary AI educational systems possess the same emotional learning capacities as teachers? Take Xiaoice, an emotionally intelligent robot, as an example. It is known as "the most human-like AI" because its program incorporates empathy and social abilities, and more crucially, it has an emotional computing module that enables emotional interaction with humans (20). However, it is important to note that the emotions of AI are conveyed to the existing program, although for humans, there are different methods to express the most fundamental emotions; AI technology is not yet prepared for complex emotional communication. The current average state of "high IQ and low EQ" in AI makes it hard to replace teachers with AI for emotional education. Consequently, educational AI is unable to attain the desired development of student emotions and attitudes.

Countermeasures to Educational Artificial Intelligence's Ethical Risks

Due to the colossal impact that education has on the lifelong development of humans, every part of it must be carefully scrutinized. Educational ethics may not be represented in writing, but it is intimately linked with the ideals of education, guiding the path of the education system and implicitly affecting the behavior of the educated. Risks represent the indeterminacy between objectives and outcomes. To improve the use of AI in education, we must take precautions against underlying ethical risks.

Re-defining the Core Role of Teachers in Education

In the traditional setting of education, teaching activities are varied and time-consuming, taking place both within and outside of the classroom. Teachers expend a substantial amount of time and energy on educational activities linked to after-class tasks. In the current situation in China, both students and teachers require a reduction in their workloads. Educational AI is capable

of sharing a portion of the teaching effort with high levels of effectiveness, performance, and ease. The Marking Network, an online platform that uses computer programs to autonomously grade English essays, has been cited by the Journal of Artificial Intelligence as an example of AI's contribution to educational modernization. It can correct and score compositions online, analyze the composition's results through data mining and analytics, and then provide graphic reports (21). The replacement of time-consuming instructional activities by AI applications is not only feasible, but also has practical implications.

In the era of AI technology, the focus of teachers' jobs will shift from teaching knowledge (which can be delegated to AI) to moral character and value education, which is more complex and higher-order. Moreover, social education should be a primary responsibility of educators. Humans are social animals that cannot exist outside of civilization. Teachers should assist kids in developing social and emotional skills to prepare them for future social integration. Opportunities in teacher-student interaction and inter-student communication can be utilized to cultivate co-operation and collaboration among students (22). Moreover, in this age of information explosion, students are exposed to an abundance of positive and negative material on the Internet. It is the obligation of teachers to instruct students on how to use intelligent resources responsibly (23). The challenges of the digital age require the development of students' skills in information filtering and applicable conduct.

Implementing Effective Regulation of Educational Artificial Intelligence *Enhancing Educational Data Security Regulation to Ensure Transparency and Privacy Protection*

The law gives the owner of privacy the right to prevent the invasion of personal information. Presently, there is no institutionalized, long-term assurance of the security of educational data, and corresponding regulatory structures are incomplete; information leaks and unlawful data exchanges occur often. Data security issues may emerge at various stages of the entire AI lifecycle; hence, the legal framework must permeate all phases of research and implementation. For instance, when users check in to a particular clever program, they may be prompted to provide their cell phone number in order to verify their identity, and the application will immediately gather this information. The training of technical developers of AI apps should be prioritized by relevant government agencies in order to raise their knowledge of privacy protection. Providers of AI apps must adhere to technological openness, particularly throughout the development phase; once data leakage happens, a high level of transparency can produce direct and valid evidence (24). In addition, schools should develop a comprehensive privacy monitoring system to oversee AI applications brought into school instruction or administration and to safeguard user privacy at all times.

Emphasizing Accountability for Educational Data Security

Effective educational AI regulation cannot exist without accountability. The Measures for the Regulation of Educational

Data of the Ministry of Education's Organizations and Directly Affiliated Institutions announced in 2018 by the Chinese Ministry of Education stipulated the fundamental premise of "responsibility for respective administrative realms" (25). However, the agreement does have certain limitations; it restricts investigations of accountability to organizations and institutions officially supervised by the Ministry of Education. In addition to educational data security, relevant agencies should be held accountable for the selection of student-accessible AI-applied content. As an emergent business with enormous commercial potential, educational AI has attracted considerable investment, but the relevant accountability rules are not yet in place, highlighting the necessity of building a retroactive accountability framework.

Promoting Educational Equity in the Application of Artificial Intelligence

AI technology has fostered innovative teaching techniques, such as paperless education, which are gaining popularity in industrialized nations and areas. Due to a shortage of smart devices, however, children in disadvantaged areas must adhere to fairly traditional teaching techniques. In order for the education equalization system to actually benefit every student, the government should enhance investment in educational AI at the obligatory education level and construct an online educational resource sharing platform to offer all students high-quality re-

sources at no cost (26). Otherwise, technological progress will merely intensify the "Matthew Effect" in education and exacerbate regional educational inequality. In order to prevent the output of discriminating data, the principles of fairness and equality should be incorporated into educational AI's algorithms from the earliest stages of design and development. The evolution of science and technology has been far faster than the evolution of ethics and morals, necessitating the incorporation of a principle of fairness with a long-term perspective into educational AI applications and preventative measures against biased information.

Conclusion

In today's information-based society, where learning is ubiquitous, integrating AI into education is critical. With its high efficiency and versatility, AI technology has aided educational advancement. However, in order to reap the benefits of AI's conveniences and prospects, we must first assess the risks and provide remedies (24). Teachers and students should adjust to their roles in education, adapt to the new teaching ecology, and improve their AI literacy required in the information age to address potential ethical risks. To enhance educational equity, the state should institutionalize regulation of educational data security and usage of AI technology. ■

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