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Education For Sustainable Development in The Era of Artificial Intelligence: A Critical Analysis

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ABSTRACT

In the ongoing era of artificial intelligence, knowledge is free. From solving mathematical problems to writing assignments, several artificial intelligence tools are utilized. However, its indiscriminate use makes it challenging to maintain educational integrity.

This paper critically analyzes the rapid growth and widespread adoption of artificial intelligence tools in education for sustainable development from both Indian and international perspectives. In 2015, the United Nations listed Quality Education as one of the Sustainable Development Goals (SDGs). This was done to address global challenges like poverty, inequality, climate change, environmental degradation, peace, and justice by 2030.

Artificial intelligence has shown immense potential in the academic sector and has been repeatedly misused, too. Studies indicate the boon of artificial intelligence in education, including task automatization, grading papers efficiently, interactive and engaging teaching-learning aids, among others. However, over-reliance on ChatGPT may lead to academic procrastination. Excessive use of ChatGPT as a tool for critical thinking and problem-solving skills may hamper the innate ability to develop a deeper understanding of information, leading to a gradual cognitive decline.

Following ethical guidelines, fostering critical thinking skills, maintaining transparency, and encouraging skill diversification can help counter the negative effects of the over-dependence on artificial intelligence.

Keywords: *academic procrastination, artificial intelligence, education for sustainable development, memory, sustainable development goals*.

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Introduction

Education makes us a smarter, more informed, and evolved race. It helps boost economic growth and allows people to lead a healthy lifestyle with a high standard of living and quality of life. On the other hand, sustainability is the main focus of the Earth Charter Initiative, which is an international declaration of fundamental ethical principles built for a peaceful global society in the 21st century. Sustainable development refers to the processes that help ensure social, ecological, and economic well-being for all at the local, regional, and global levels. The

seven key concepts of sustainable development are interdependence, citizenship and stewardship, needs and rights, diversity, quality of life, sustainable change, uncertainty, and precaution in action.

One of the ways to create a sustainable world is through the gateway of education. We are usually educated by and large to 'compete and consume' rather than 'care and conserve' (Orr, 1994). Thus, there was a dire need to change the educational paradigm to help address the environment. This led to the idea of 'sustainable education,' which is a transformative paradigm that values human potential. It is concerned with the need to attain and sustain social, ecological, and economic well-being. In essence, the vision of Education for Sustainable Development (ESD) refers to the types of pedagogy required to ensure well-being in the present and the future. It is essential for the development of a sustainable society and is, therefore, desirable at all levels of formal education and training, as well as in non-formal and informal learning (Council of the European Union, 2010). The integration of artificial intelligence (AI) in the education sector has become a transformative force for sustainable development. From the personalization of learning experiences and enhancement of educational outcomes to fostering critical skills essential for sustainability, AI has great implications in education. Access to AI technologies helps ensure that educational advancements benefit all learners across the globe (Judijanto et al., 2022).

India is working hard to determine the success of the SDGs globally. The Indian Government is committed to Agenda 30 and the SDGs. The National Development Agenda of India highlights the measures that the government is taking on global issues like poverty, sustainable growth, health, nutrition, gender equality, and quality education, amongst several others. The Indian Government amended the Constitution to include the 'Right of Children to Free and Compulsory Education' (RTE Act, 2009). Several schemes and programs have come up to ensure that children from vulnerable parts of society enroll in and attend schools like Samagra Shiksha, Sarva Shiksha Abhiyan, Rashtriya Madhyamik Shiksha Abhiyan, and Teacher Education. Several initiatives like Shala Kosh, Shagun, and Shaala Saarthi, among others, have been introduced to augment the use of digital technology in education via smart classrooms, digital boards, and direct-to-home channels. Different types of scholarships, vocational training centers, education loans, academic schemes, and training programs for learners and teachers have been implemented in the country.

Research published earlier has shown the impact of artificial intelligence in the arena of education. However, very few have reported a critical analysis highlighting its positive and negative sides with an emphasis on research work done in India and other foreign countries. This particular gap in past literature was identified. Thus, the need to critically analyze the role of AI in education for sustainable development from both the Indian and foreign perspectives has been taken up in the present study.

Method

This study aims to critically analyze the existing literature to understand the influence of artificial intelligence on education for sustainable development in the present era. It is evident by now that

artificial intelligence (AI) is here to stay. Thus, there is a need to analyze its positive effects and negative effects and also utilize them to achieve sustainability in the education sector. This paper also intends to highlight the difference in the studies published on this topic in India and from other parts of the world. The past literature is therefore critically analyzed to shed light on AI's role in our lives, with special emphasis on education and the need for sustainability.

The critical analysis done in this study draws relevant information from published research articles collected from databases of SCOPUS and Google Scholar from February 2019 to February 2024. The identification of relevant research papers was done using keywords including "education AND for AND sustainable AND development", "artificial AND intelligence AND education AND for AND sustainable AND development AND in AND India", "role AND of AND artificial AND intelligence AND in AND education", "positive AND influence AND of AND artificial AND intelligence AND on AND education", "negative AND influence AND of AND artificial AND intelligence AND on AND education". The abstract and full-text screening was done by the authors to include only the relevant research articles on the selected topic.

Results and Discussion

The prevalence of using artificial intelligence in the education sector

Artificial Intelligence (AI) can help revolutionize teaching and learning methods. It can accelerate the progress towards Quality Education (SDG 4). UNESCO's mandate aims for an inherently human-centered approach to AI.

From the Indian perspective, Harish et al. (2023) report that sustainable education is a method that emphasizes instilling a sense of environmental responsibility in students and raising awareness about the significance of environmental stewardship in local communities as well as on a global scale. According to Tilak (2020), AI can deliver smart content, prepare intelligent tutoring systems, create virtual facilitators and learning environments, intelligently mine student data, automate basic academic activities like grading or assessments, customize educational software according to the needs of students, point out areas for course improvement, provide additional support, provide readymade feedback for students and educators, and eventually transform the role of teachers, and the learning process for students. A school in Kerala also introduced India's first Generative Artificial Intelligence enabled robot teacher named Iris in collaboration with Makerlabs Edutech in August 2023.

From the international perspective, a survey conducted by Filho et al. (2024) reported that AI is quite widely spread, and its impact is likely to increase in the coming years due to more demand. The needs of post-industrial individuals are increasingly concentrated on sharing products enabled with AI, including distance work, virtual games, movies, virtual journeys, social networks, smartphones, and smart appliances, to name a few. People have been found to gradually limit, restrict, and even terminate some of their natural needs but deepen their artificial, especially virtual needs.

However, according to Xie et al. (2023), it is crucial to identify the ill effects of AI-assisted cheating, which degrades the quality of education, creates an unfair advantage for the users, damages the integrity of the academic institutions, and hinders students' prospects of securing employment or gaining admission in graduate schools.

Positive implications of artificial intelligence on education for sustainable development

The use of AI in education can enhance the efficiency of teachers by sparing them from performing high-level intellectual tasks in teaching, doing routine checking of student work, and identifying learning gaps. AI can be incorporated in several ways - robot teachers, personalized educational services, automated grading systems, natural language processing, virtual reality, administrative tasks, creation of smart content, multilingual teaching, and data-driven insights. All these strategies can help achieve quality education for all.

In the Indian context, Aggarwal et al. (2023) pointed out that AI allows for personalized learning experiences customized to individual demands. Adaptive learning can improve learning outcomes and also reduce dropout rates. It can reduce the cost of educational resources.

From international research, a study by Kamalov et al. (2023) suggests that AI has the potential to positively influence higher education. AI-powered platforms can offer a wide range of educational resources and provide scope for enhanced communication with real-time feedback, which is a basic factor for sustainable education.

In brief, it can be mentioned that today, artificial intelligence has already become a powerful tool around the world.

Negative implications of artificial intelligence on education for sustainable development

Just as every coin has two sides, the impact of artificial intelligence on education also comes with its demerits.

From the Indian context, Jaiswal & Arun (2021) report that although instant feedback is welcome, its abundance may prove to be overwhelming for students. Dubey et al. (2022) have highlighted that the rampant use of AI in education can lead to the deterioration of values, pose a threat to human civilization, reduce employment opportunities, lead to complete dependency on technology, widen the learning gap, and cause issues with data management and cybersecurity. The Generative AI-powered robot teacher, Iris, was found to understand and speak different languages and solve complex problems. However, it cannot work in noisy environments, interpret human emotions, or provide emotional support and encouragement to students.

From the research works done internationally, Fugener et al. (2021) report the loss of 'human touch' in learning environments as a direct negative implication of the use of AI in academics. It is necessary to protect against unauthorized data use and breaches, safeguarding student privacy and trust. Alufaisan et al. (2020) emphasize the demystification of complex systems of algorithms so that both learners and educators can understand and trust the AI tools with which they engage. Zhou et al. (2020) highlight ethical considerations, such as informed consent, data ownership, and

algorithmic accountability. Chatbots should be aligned with fundamental human values and our legal system. Mbakwe et al. (2023) suggest that bias in chatbots may stem from the use of research primarily conducted in high-income countries or textbooks not universally applicable. Another serious concern is student plagiarism.

The consequences of heavy AI use are manifold. Markauskaite et al. (2022) argue that AI-assisted learning may decrease academic performance by promoting the passive consumption of information. It allows easy access to answers at any time, without the need to manually look up study materials. This can hinder students' ability to deeply comprehend the subject matter (Crawford et al., 2023). Eager & Brunton (2023) found that AI-enabled learning companions negatively affect social interaction amongst students. The quick answers generated by AI tools hamper the development of students' problem-solving skills. According to Abbas et al. (2024), students having high academic workloads and time pressure reported higher use of ChatGPT. Also, students more sensitive to rewards were less likely to use ChatGPT. This could be due to the fear of getting caught. Overdependence on ChatGPT can have harmful effects on academic outcomes. Students who overused ChatGPT were found to procrastinate more, reported memory loss, and had poor scores.

All these studies indicate that a student's over-reliance on AI tools for academic purposes is harmful. This further leads to several negative outcomes like cheating, decline in academic grades, academic procrastination, disinterest in studies, lack of motivation in learning, lack of commitment towards education, and decline in knowledge and skills. This does not indicate the sustainability in education.

Conclusion

Education is the foundation of a society that aims towards growth and development. Education helps to reconnect to the sense of place and real-world inquiry, empowering the learner and teacher. Honing multiple teaching styles, developing dialogues, creating space for emergence, and learning for action are the need of the hour. Facilitating reflection on learning (reflexivity) and encouraging transformative learning helps promote sustainability. Also, collaborative learning, co-inquiry, and using the campus as a learning resource are some initiatives that can be taken to promote education for sustainable development. Several methodological approaches like simulations, role plays, group discussions, debates, diary-writing, brainstorming on critical incidents (posing critical incidents and asking what students would do), and dissecting case studies can help inculcate sustainable education practices. Providing learners with reflexive accounts, encouraging personal development planning, critical reading, writing, problem-based learning, fieldwork, learning by doing, modeling good practice, hands-on learning practices, future visioning, worldview and values research, action research, and the like can together help achieve sustainability.

The present paper highlights several relevant research works carried out in India and in other parts of the world based on the role of AI in sustainable education. Although there are a few studies done from the Indian perspective, as compared to the research work done internationally, not much of a

difference exists between findings based in India and other foreign countries. Considering AI as a global game-changer in the area of education, its careful application for sustainable education should be the recommendation for every country. One needs to identify how technological advancements can be harnessed to the best of one's ability in an attempt to ensure inclusivity, equity, quality in education, and lifelong learning opportunities for all. Thus, blindly relying on AI tools for academic purposes can pose a threat in the long run. The individual needs to learn different ways to augment learning outcomes with the help of artificial intelligence in the modern era. The potential benefits of AI in education cannot be denied. However, the uncertainty of ethical concerns in pedagogical implications indicates a gray area that needs further clarification. There is a dire need for guidelines and policies to ensure the responsible use of AI tools. A person has to become wise enough to utilize the positive side of AI technologies and realize its shortcomings. This would enable a wiser and better-informed utility of the technology to realize its fullest potential.

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