Journal of Educational Foundations [Special Edition], 2025 - Volume 14, Issue 3:076-084
https://jef.unn.edu.ng/

THE ROLE OF ARTIFICIAL INTELLIGENCE ON PHILOSOPHY OF TEACHER EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Abstract

This paper examined the implications of Artificial Intelligence (AI) on the philosophy of teacher education in Nigeria, focusing on sustainable development. As AI increasingly influences teaching, learning, and assessment, it raises fundamental questions about the purpose, value, and ethics of education. This study synthesizes existing research to explore the intersections between AI, philosophy of education, and sustainable development. It highlights AI's potential to enhance student learning outcomes, improve teacher effectiveness, and address concerns about bias, ethics, and the human labour market. The paper delves into the social dimensions of AI's impact on philosophy of teacher education including: redefinition of teaching and learning; emergence of new forms of intelligence cognition and existing social inequalities; transformation of the human labour market; ethical considerations surrounding AI development and deployment. Ultimately, this study aims to spark a nuanced discussion on the future of philosophy of teacher education and its role in shaping a sustainable and equitable educational system in Nigeria. It emphasizes the need for a future-oriented approach to philosophy of teacher education, one that prepares students for a rapidly changing world and fosters the skills, values, and dispositions necessary for sustainable development.

Keywords: AI, philosophy of education, teacher education, sustainable development.

Introduction

The rapid advancement of Artificial Intelligence has introduced a paradigm shift in education, reshaping how teaching, learning, and assessment are conceptualized and practiced. The philosophy of teacher education, which provides the foundation for preparing educators, is being redefined by the increasing adoption of Artificial Intelligence in schools and higher institutions. Artificial Intelligence technologies such as adaptive learning systems, intelligent tutoring systems, and natural language processing are no longer futuristic innovations but present realities influencing classroom practice. These developments call for a critical examination of how the philosophy of teacher education adapts to new demands while ensuring its alignment with sustainable development goals.
Artificial Intelligence offers opportunities for enhancing teacher effectiveness and student outcomes. Automated grading systems reduce administrative burdens, allowing teachers to devote more time to pedagogy and mentorship. Adaptive learning platforms personalize instruction, meeting the diverse needs of students and enabling differentiated teaching. Intelligent tutoring systems provide individualized feedback and support, complementing the teacher's role. Similarly, natural language processing tools assist in tasks such as essay evaluation, translation, and feedback generation, thereby improving instructional efficiency. These contributions demonstrate that Artificial Intelligence can play a transformative role in redefining teacher education by promoting innovation, inclusivity, and improved learning outcomes (Perkins and Salomon, 2019).

At the same time, integrating Artificial Intelligence into education raises significant ethical, social, and philosophical concerns. The risks of algorithmic bias, data

privacy violations, and cultural exclusion challenge the traditional values of education. In Nigeria and other developing contexts, Artificial Intelligence-powered educational systems may inadvertently reproduce socio-economic and linguistic inequalities. This reality underscores the necessity of ethical reflection in Artificial Intelligence development and its integration into teacher education. Ethical responsibility, human agency, and equitable access remain central issues in ensuring that Artificial Intelligence supports rather than undermines the goals of sustainable development (Rutherford, 2020).

Reflecting on the role of Artificial Intelligence in teacher education is therefore crucial for several reasons. First, Artificial Intelligence must be developed and deployed responsibly to prevent bias, discrimination, and erosion of human dignity. Second, Artificial Intelligence challenges the autonomy of teachers and learners, demanding a careful balance between technological support and human values. Third, the alignment of Artificial Intelligence with sustainable development highlights the responsibility of education systems to use technology to advance the Sustainable Development Goals, particularly those related to quality education, reduced inequality, and innovation. Finally, Artificial Intelligence invites a re-examination of the purpose of education itself, its values, aims, and relevance in preparing citizens for a sustainable future. The philosophy of teacher education, in this context, must evolve to integrate Artificial Intelligence critically and responsibly. This requires answering fundamental questions: How can Artificial Intelligence support education for sustainable development? In what ways can Artificial Intelligence-powered teacher education contribute to the achievement of the United Nations Sustainable Development Goals? How can negative consequences such as bias and inequality be mitigated? Addressing these questions will enable teacher education to harness Artificial Intelligence as a tool for innovation and inclusivity, while preserving the core values of equity, dignity, and sustainability.

Conceptualization

The impact of artificial intelligence on the surveillance of philosophy of teacher education involves the use of AI-powered monitoring and evaluation systems to track teacher performance, student learning outcomes, and educational quality, utilizing data analytics, machine learning algorithms, and natural language processing to analyze teacher-student interactions, lesson plans, and student assessments, raising concerns about teacher autonomy, data privacy, and the potential for biased or unfair assessments, as well as the need for transparency, accountability, and equity in AI-driven teacher evaluation systems. Artificial Intelligence (AI) is transforming the philosophy of teacher education landscape, raising fundamental questions about the nature of learning, teaching and knowledge. Epistemology is the branch of philosophy that deals with the nature, sources, and limits of knowledge that are crucial for understanding the advancement of Artificial Intelligence (AI). AI's advancement raises fundamental epistemology questions about knowledge, justification, reasoning, learning, and bias. Thus, by exploring these questions one can better understand the nature of AI-generated knowledge and its implications for various domains (Adenyi, 2020).

Understanding these epistemological aspects of AI is essential for developing reliable, explainable, and ethical AI systems that can augment human knowledge and decision-making. Artificial Intelligence (AI) is the field of computer science that focuses on building system that can perform tasks that typically require human intelligence. Artificial Intelligence (AI) is fascinating fields of computer science that focuses on creating intelligent machines capable of learning, reasoning, and acting like humans

(Mitchell, 2018). The question is can machines think? Bostrom, 2014, defined Artificial Intelligence as field of research and development that aims to create machines that can perform tasks that typically require human intelligence, such as understanding language, recognizing images, and making decisions. Philosophy of education is a branch of philosophy that deals with the nature, aims, and methods of education. It encompasses various philosophical perspectives on the purpose and value of education, the nature of knowledge and reality, and the ideal relationship between teacher and student. Philosophy of teacher education has a significant impact on educational practices, policies, and institutions. It shapes our understanding of what education is for, what it should achieve, and how it should be conducted.

Artificial Intelligence is becoming increasingly important to the teaching and learning of philosophy of education, as it reshapes how knowledge is delivered, accessed, and evaluated. One of the central contributions of AI is its capacity for personalized learning, where adaptive algorithms tailor educational experiences to students' individual needs, abilities, and learning styles, thereby deepening their understanding of complex philosophical concepts. Beyond personalization, AI-powered tools such as chatbots, virtual assistants, and intelligent tutoring systems create interactive and immersive learning environments that enhance student engagement and motivation. Intelligent feedback and assessment systems driven by AI provide immediate, individualized responses, allowing students to track their progress, address weaknesses, and refine their reasoning skills, while enabling instructors to devote more time to mentorship and pedagogical innovation. AI also fosters virtual debates and discussions, providing platforms where students critically engage with philosophical ideas in dynamic and participatory ways, thus reinforcing dialogical and reflective traditions in philosophy of education. Moreover, AI broadens access to rare and ancient philosophical texts, offering students the opportunity to explore historical perspectives and connect them to contemporary debates (Dziuban & Maskal, 2018). Importantly, AI-driven analytics can support teacher education by identifying patterns in student learning and suggesting evidence-based strategies, thus strengthening the philosophical foundation of reflective practice (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). At the same time, AI offers opportunities for advancing sustainable development by supporting equitable access to philosophical resources across different cultural and socio-economic contexts (UNESCO, 2021). Collectively, these contributions highlight that AI is not only a technological tool but also a transformative force capable of reshaping the philosophy of teacher education toward inclusivity, reflective practice, and global sustainability.

Ethical Considerations

An ethical consideration plays a crucial role in the philosophy of teacher education, as they shape the values and principles that guide teaching, learning, and decision-making in educational setting. It is crucial when developing and implementing AI-powered adaptive learning and intelligent tutoring systems. Ethical reasoning is a systematic approach to decision-making that considers ethical principles, values, and theories. It involves: identifying ethical issues and dilemmas; gathering relevant information and context; analyzing and evaluating different perspectives and arguments; applying ethical principles and theories; making a decision or judgment; and justifying and communicating the decision. Ethical dilemmas in philosophy of teacher education refer to situations where educators, administrators, or policy-makers face conflicting values, principles, or loyalties

that require difficult decisions. Some examples of ethical dilemmas in philosophy of education include the following:-

a) Inclusive education is an approach to education that values diversity and promotes the inclusion of all students, regardless of their background abilities, or disabilities. It is approach that recognizes that all students have the right to learn and participate in the educational process. Philosophy of education provides the theoretical foundations for inclusive education. Some of the key philosophical perspectives that underpin inclusive education include: Social justice which is the belief that all students have the right to equal access to education and opportunities to succeed; Care ethic is the belief that education should prioritize the well-being and care of all students; Critical pedagogy emphasizes that education should empower students to critique and challenge dominant norms and structures; and pragmatism which is the belief that education should be student-centered and focused on practical problem-solving. By embracing inclusive education one can create a more just, equitable, and supportive learning environment for all students.
b) Cultural sensitivity in philosophy of education refers to the recognition and respect of diverse cultural backgrounds, values, beliefs and practices in the educational setting. It involves understanding and addressing the ways in which culture shapes students' learning experiences and outcomes. Cultural sensitivity and Artificial Intelligence are crucially interconnected. AI systems can perpetuate and amplify existing cultural biases if they are not designed with cultural sensitivity in mind. Some key considerations of cultural sensitivity are: Data bias, AI systems are often trained on data that reflects existing cultural biases, perpetuating stereotypes and discrimination; Algorithmic bias, AI algorithms can also perpetuate cultural biases, even if the data is neutral; Lack of diversity, AI development terms often lack diversity leading to a limited perspective and potential cultural insensitivity; and cultural appropriation, AI systems may appropriate cultural symbols, language, or practices without proper understanding or respect. By prioritizing cultural sensitivity in AI development, one can create more inclusive and respectful systems that value diversity and promote social good.
c) Teacher-student relationship is a crucial aspect of philosophy of education as it raises important questions about the nature of teaching, learning, and the roles of teachers and students. The development and deployment of Artificial Intelligence (AI) raises significant ethical concerns, making ethical frameworks essential to ensure responsible AI development and deployment. Ethical frameworks provide guidelines and principles to address issues like: bias and discrimination; privacy and data security; transparency and explainability; accountability and responsibility; human oversight and intervention; and value alignment with human ethics and morals (Perkins & Salomon, 2019).

Curriculum Redesign for AI in Teacher Education

The integration of Artificial Intelligence (AI) in education necessitates a philosophical redesign of teaching and learning practices. This redesign requires a fundamental shift in how to approach teacher education, focusing on the development of teachers who can effectively harness the potential of AI to enhance student learning. Globally, the curriculum is considered fundamental to educational institutions. Curriculum has been defined as prescribed course of studies, which students must learn in order to reach a certain level of education (Edozie, 2016). It is the totality of content and experiences

which are planned and delivered for people through their education, wherever they are being educated, to meet the emerging demands for education in the AI-driven world. Curriculum redesign in philosophy of teacher education in Nigeria involves rethinking and revising the curriculum to align with contemporary philosophical perspectives, educational research, and Nigeria's specific cultural, social, and economic context. AI in teacher education refers to the integration of Artificial Intelligence technologies and techniques into teacher training programmes, aimed at enhancing teaching and learning experiences. This curriculum provides a comprehensive overview of AI in teaching and learning, including AI-powered tools, Pedagogical strategies, and ethical considerations.

To understand the impact of AI, there is need to understand what AI is and what it can do. Deep expertise in AI technology is scarce, and many educators and policymakers now struggle to get up to date with basic knowledge in this area. In the midst of self-teaching and learning machine, chatbots, and the AI-powered learning, it may be easy to think that AI is rapidly becoming super intelligent, and gain all the good and evil powers awarded to it in popular culture. This, of course, is not the case. The current AI systems are severely limited, and there are technical, social, scientific, and conceptual limits to what they can do. Perhaps surprisingly, well-established research on human learning provides important tools and concepts that help us understand the state-of-the-art and future of AI. The transformative impact of general purpose technologies becomes visible only gradually, when societies and economies reinvent themselves as users of new technologies. Technological change requires cultural change that is reflected in lifestyles, norms, policies, social institutions, skills, and education. Exploring the philosophical implications of AI in teacher education, by examining these issues, teacher and educators can better understand the potential impacts of AI on teaching and learning, and work to ensure that AI is used in ways that promote social justice, equity, and human flourishing. Education all over the world is seen as a process of transmitting the cultural heritage, stabilizing the present and improving or changing the future of the people. The school system in this regard is generally accepted as a major agent of education. This makes the factor of the teacher central in the task of education. Today, teacher education is considered to be the foundation for quality and relevance in education at all levels. The National Policy on Education, published in 2014 clearly articulates the importance attached to teacher education and affirms that "no education system can rise above the quality of its teachers".

The Policy gives the goals of teacher education as: Producing highly motivated, conscientious and efficient classroom teachers for all levels of our education system; Encouraging the spirit of enquiry and creativity in teachers; Helping teachers to fit into the social life of the community and the society at large and to enhance their commitment to national goals; Providing teachers with the intellectual and professional background adequate for their assignment and to make them adaptable to changing conditions; Enhancing teachers' commitment to the teaching profession (FRN, 2014). The Policy makes it mandatory for all teachers in Nigeria to be trained and stipulate Nigeria Certificate of Education (NCE) as the minimum qualification to the profession. The policy also provides that "teacher education shall continue to take cognizance of changes in methodology and in the curriculum" and that teachers shall be regularly exposed to innovations in their profession. It further recognizes the need for in- service training "as an integral part of continuing teacher education". There is therefore the need for all Nigerian teachers to be proficient in computer education. It is only when teacher education is well equipped in computer (Artificial Intelligence) teaching that can imbibe the new

technologies and methodologies of the 21st century. There is also the need for training our future teachers on entrepreneurial skills development. It is only when teachers are well equipped with such skills as Artificial Intelligence that they can transfer them to students. Finally, the task of improving teachers' welfare must be addressed by our governments in Nigeria. The working environment must be well equipped to retain qualified and experienced teachers in our classrooms. Teachers' salaries should be paid regularly while other social benefits should be provided to motivate and retain teachers. Although some of this excitement may be based on unrealistic expectations and limited knowledge of the complexities of the underpinning technologies, it is reasonable to expect that the recent advances in AI and machine learning will have profound impacts on future labour markets, competence requirements, as well as in learning and teaching practices. As educational systems tend to adapt to the requirements of the industrial age, AI could make some functions of education obsolete and emphasize others. It may also enable new ways of teaching and learning. In particular, AI-based systems can become widely used as systems that support teachers and learners. AI can also rapidly change the economy and job market, creating new requirements for philosophy of education in particular and educational systems in general.

Artificial Intelligence and Sustainability in Teacher Education

Teacher education in the 21st century classroom depends on the emerging technologies to be relevant in the global perspective in education. To successfully discuss the emerging technology issues, teacher education should be addressed on the bases of availability, accessibility and competency of the emerging technologies. The modern classroom requires a variety of instructional strategies and facilities to add value to the traditional methods, by integrating today's technological devices across all content areas in the educational sectors. The emerging technology is changing the narratives in the teaching learning processes. Obviously, more technologies are emerging and upgrading by the day. This also implies that teachers in the 21st century classroom should upgrade themselves along the emerging technologies phenomenon. The number of emerging technologies available to support teaching and learning is growing exponentially.

Sustainability in teacher education is essential for the development of Nigeria's education system is crucial for Nigeria's education system. To achieve this, building the capacity of teacher educators to integrate sustainability into their teaching practices is critical. Mormah & Bassey, (2021) emphasized the importance of integrating emerging technologies into teacher education in Nigeria to enhance teaching and learning processes, highlighting the need for teacher competency, availability, and accessibility of technology, as well as government support and policy formulation to ensure effective technology integration in the 21st century classroom. To ensure the development of Nigeria's education system, sustainable teacher education is vital, providing training and support for teacher educators to develop their capacity to integrate sustainability into their teaching practices. Leveraging digital resources in teacher education enhances sustainability education and professional development, providing educators with innovative tools to integrate sustainability into teaching practices. The use of digital resources, including a broad spectrum of emerging Technologies like computers, interactive boards, ipads, radio, audio streams, internet, and 5G devices, facilitates the enhancement of sustainability education and professional development, with variations in technology types and classification. Despite adequate access to E-leaning technologies, teachers often fail to integrate them into their teaching practices due to competency gaps or mindset barriers,

which can be addressed through professional development focusing on technological skills, collaborative support, and mentoring. To enhance teachers' technology integration, professional development should focus on developing technological skills, fostering collaborative environments that promote knowledge and emotion sharing, and providing increased mentoring, which can be supported by technology to improve teachers' attitudes and practices (Bostron, 2014). As government and other education providers increasingly leverage emerging technologies to enhance classroom activities, the 21st century teachers must develop the knowledge, skills, and competency to effectively integrate technologies like AI into their teaching practices, particularly in philosophy of education.

Philosophical implications of AI to Teacher Education

Artificial Intelligence (AI) has the potential to enhance the teaching profession by providing teachers with powerful tools and resources to support student learning. The integration of AI in teacher education has several philosophical implications: teaching as a profession includes are: expertise in subject matter; teacher identity; pedagogy and epistemology; ethics and values; and human-AI relation. Teaching is a complex and multifaceted profession that involves more than just transmitting knowledge to students. It requires a deep understanding of the subject matter, pedagogy, and the ability to adapt to diverse learning needs. Some of the key aspects of teaching as a profession: expertise in subject matter; pedagogical knowledge; classroom management; assessment and feedback; continuous professional development; and ethical practice. AI may challenge the traditional notion of teaching as a profession, potentially replacing some aspect of teaching. The teachers may need to redefine their role and responsibilities in the face of AI-driven automation of teacher identity.

Teacher identity refers to the professional and potential beliefs, values, and experiences that shape a teacher's sense of self and their practice. The integration of AI in education has the potential to impact teacher identity in various ways: changes in teacher roles; new skills and competencies; teacher-AI collaboration; teacher autonomy and agency; and ethical consideration. AI has the potential to enhance teacher identity by providing teachers with powerful tools and resources to support student learning. However, it also raises important ethical and philosophical considerations that must be addressed to ensure that AI is used in ways that promote social justice, equity, and human well-being. Imparting Artificial Intelligence consciousness into the teacher educators in the teaching and learning of philosophy of education into Nigerian education system is a means of achieving sustainable development. Nigeria cannot talk of sustainable development without a sound teacher's acquisition and nurturing of science and technology. Adequate exposure to science and technology can make the Nigerian students creative and innovative, thereby being able to contribute to socio-economic advancement of Nigeria.

AI and Sustainable Philosophy of Teacher Education

Artificial Intelligence integration in teacher education requires a human-centered approach that promotes inclusiveness, transparency, and critical thinking to enhance personalized learning, teacher support, accessibility, and education system efficiency, ultimately improving student outcomes and fostering a culture of continuous learning, creativity, and innovation. Integrating AI into the philosophy of teacher education in Nigeria can create a more sustainable education system by leveraging AI-driven personalized learning through adaptive learning systems and intelligent tutoring systems, enhancing teacher support through AI-powered teacher assistants and professional development platforms, increasing

accessibility through virtual learning environments and language support tools, providing actionable insights through AI-driven education analytics and predictive analytics, informing curriculum development through AI-powered curriculum design tools and AI-enhanced content creation.

Conclusion

The transformative impact of Artificial Intelligence (AI) on education necessitates a philosophical approach that prioritizes human well-being, equity, and justice, acknowledging AI's potential benefits, such as personalized learning and increased access to quality education, while addressing the ethical and philosophical concerns related to knowledge, teaching, and human relationships. As AI continues to evolve and influence education, teacher educators must adopt a nuanced philosophical approach, recognizing AI's potential to enhance education, while also addressing the complex ethical and philosophical concerns it raises, to create a more equitable, just, and sustainable education system. The interplay between AI, philosophy of teacher education, and sustainable development requires a nuanced understanding, as AI presents both opportunities for personalized learning and automation, and challenges related to the nature of knowledge, teacher roles, and human relationships, which must be addressed to create a more just and sustainable education system. The integration of AI in education is a double-edged sword, providing opportunities for personalized learning, automation, and increased access to quality education, but also generating important ethical and philosophical concerns about the nature of knowledge, teacher roles, and human relationships. AI's influence on the development of philosophy of teacher education for sustainable development is examined by the researcher, revealing a paradigm shift in which teachers evolve into facilitators and mentors, learners assume a more active role, and education system adapt to new technologies and pedagogies, driven by AI-generated knowledge.

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