Use of Artificial Intelligence in Education Management: Potentialities and Challenges

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Abstract

Rapid technological developments will continue to impact human activities at organizational, institutional, human, and material levels. The adoption and use of artificial intelligence (AI) in the education sector is an illustration of the transformative power of technology. AI offers numerous opportunities to the education sector, such as content generation, text analysis and synthesis, learning facilitation, course preparation, and student learning assessment and path monitoring; etc. It also presents significant challenges such as plagiarism, the decline of creativity under certain conditions, the lack of respect for privacy, and the spread of gender-based bias. One might think that AI is a double-edged sword. While it can be used to improve educational practices, it could also be misused by ignoring ethical rules. This is why it must be governed by laws, policies and strategies that allow it to be enjoyed safely without violating ethical values, private life, and the principles of intellectual property.

Keywords: Artificial intelligence, Education management, Personalized learning, Ethics, Inequality of access.

INTRODUCTION

Education has always been the preferred means of transmitting values to individuals, transforming their behaviour and influencing their way of life. Whatever form it takes, education is at the heart of the issues linked to the future of humanity. Expectations of education are high. In 2015, the international community renewed its commitment to accessible, inclusive and quality education for all. ***"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"*** is the fourth sustainable development goal (SDG 4) focussed on education that all nations should achieve by 2030. Achieving this objective involves adapting certain innovations and/or accelerating them or creating new ones.

Today, there are numerous technological innovations which arouse hope, growing interest but also concerns in the world. Among these, artificial intelligence (AI) and related tools feature prominently. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), AI

offers potential to address many of the major challenges in education, innovate teaching and learning practices and accelerate progress on SDG 4. However, rapid technological developments inevitably create multiple risks and challenges, as their pace has so far outpaced that of policy debates and regulatory frameworks (Miao & al., 2021, p 3). Analysing the future of AI in the global South in the *white paper of the International Development Research Center* (IDRC), Smith and Neupane (2018), assert that if we continue blindly forward, we should expect to see increased inequality alongside economic disruption, social unrest, and in some cases, political instability, with the technologically disadvantaged and underrepresented faring the worst (Smith and Neupane, 2018, p.12).

It is clear to us that the rapid development of AI and its use have both advantages and challenges for stakeholders in the education system around the world. In this context, we are entitled to question the current trends in the use of AI in education management. What are the related benefits and challenges? How to overcome the key challenges in the education sector?

RATIONALE

The purpose of this paper is to identify and describe the most prominent trends of the applications of AI to education management and propose guidelines for policy and strategy design.

In a world where technologies are emerging at a very high speed and disrupting lifestyles, offering opportunities but also raising concerns, it seems wise to us to participate in the production of relevant knowledge in order to facilitate decision-making. Lesjak & al. (2025) stated that there is a big gap in knowing how AI-based Knowledge Management tools affect education. As education technologies change, it is important to understand how these tools help improve learning. European commission states that the rapid increase in the use of AI requires that educators and students have a basic understanding of AI and data use to be able to engage positively, critically and ethically with this technology and to exploit its full potential. In the foreword of the first report on the Global Index of Responsible AI, the executive director of Montreal International Center of Expertise in Artificial Intelligence, an expert center for global partnership on AI, Sophie Fallaha (2024), stated that *"the landscape of Artificial Intelligence is undergoing a period of rapid growth. Like pieces of a vast puzzle, advancements in AI development and adoption are rapidly assembling, shaping our world in profound ways. However, this rapid progress comes with significant challenges and high stakes. Safety, ethics, privacy, and fundamental rights all demand careful consideration. Recognizing this complex landscape, there is a need for a strong and agile governance and the international dialogue is paramount to forge common ground, foster trust and strengthen capacities to address these challenges."* (Cited in Adams & al., p.6).

The knowledge produced on current trends in AI use for education management can be used to develop policies and strategies. To a certain extent, they will be able to contribute to the adoption and adaptation of the African Union's continental AI strategy, adopted in July 2024.

METHODS

The study is based on qualitative data collected from secondary sources. A secondary analysis of the data was conducted. 26 articles and policy paper were analysed to explore the link between AI and Human Capital, AI and Education Management. The analysis was conducted following a four-step process: Defining the objective of the study, conducting a thorough search using online search engines with specific keywords such as "Education and AI"; "Human Capital and AI. Shortlisting articles based

on relevance and analysing each of the 26 chosen articles in-depth. The data obtained from the secondary analysis was utilized to evaluate the scope of AI in education management, and human capital, investigate potentialities, and identify challenges.

CONCEPTUAL AND THEORETICAL FRAMEWORK OF ARTIFICIAL INTELLIGENCE

According to Antibi (2021), the idea of AI first developed in 1945 when Vannevar Bush, one of the early founders, proposed a system to increase human knowledge and understanding. He was followed by Alan Turing, who in 1950 wrote an article on the capabilities of machines to simulate human beings and their ability to perform intelligent actions such as playing chess (Antibi, 2021; p.31).

The expression "artificial intelligence" was used for the first time in 1956, during a scientific conference at Dartmouth College, in the United States, by two American computer scientists: John McCarthy[1] (1927-2011) and Marvin Minsky[2] (1927-2016). Artificial intelligence as an academic discipline was born in 1956. It was Minsky who coined the popular definition of AI, noting that "AI is the science of making machines do things that would require intelligence if done by men." The advantage of this definition is that it is broad enough to include different ideas, methods, and means. However, it lacks the use of the term "intelligent" in the human context—a term that has not yet been defined and is characterized unambiguously by the scientific disciplines engaged in the subject. Based on this limitation, and for Antibi (2021) AI consists of using information and computer systems to present behavior that appears intelligent, or to create knowledge and insights that never existed before. This definition is broad enough to include various technologies and applications and different kinds of needs to realize these abilities. At the same time, this definition is narrow enough that it does not include all areas of computing, but only those in which properties of AI are expressed.

At the beginning of the study of AI, the dominant paradigm was the "symbolic" one, which sought to duplicate high-level human thought. Over the years it was replaced by the "connectionist" paradigm, which endeavored to imitate the biological basis of human cognition through artificial neurons. These paradigms, however, failed to meet expectations beyond theoretical or laboratory demonstrations and led to the "winter of AI," when research and investments in AI were minimal for long periods of time. Due to progress in computer science research, the development of hardware and software in computing and communication, as well as cloud computing and big data, AI has significantly progressed, including in subdomains such as machine learning (ML) and artificial neural networks (ANN). (Antibi, 2021, p.31).

Technological advances have enhanced the creative capabilities of AI, promoting the widespread use of **generative artificial intelligence**. Generative AI, as the name suggests, is an artificial intelligence model used to generate content in various forms such as written text, audio, images, or videos.

Through the rapid development, adoption and use of AI tools several challenges surface that draw attention of multiple international organizations. In the first edition of the report on global index on responsible AI, Adams & al (2024), introduce the concept of **Responsible AI** that refers to the design, development, deployment and governance of AI in a way that respects and protects all human rights and

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[1] a computer scientist and researcher in the field of cognitive sciences

[2] a mathematician involved in research, inventions, and many developments in the field.

upholds the principles of AI ethics through every stage of the AI lifecycle and value chain. It requires all actors involved in the national AI ecosystem to take responsibility for the human, social and environmental impacts of their decisions. The responsible design, deployment and governance of AI are proportionate to the purpose of its use and meet the technological needs of the individuals and societies it seeks to serve. Responsible AI is our shared future, demanding a comprehensive understanding of global perspectives on AI, and an inclusive understanding of both its risks and its potential.

TRENDS IN THE USE OF AI IN EDUCATION MANAGEMENT: BENEFITS AND ISSUES

Use of AI in education management: overview of some benefits

AI is a rapidly evolving field, with a number of complex and varied technologies working together at the backend to give us intelligent and seemingly human-like responses (Abbas & Hinz, 2023).

Exploring ChatGPT's impact on student engagement in education management, an artificial intelligence language in the field of management education, by considering AI benefits and limitations, Leelavathi and Surendhranatha (2024) found that ChatGPT is effective in engaging students, nurturing critical thinking, and fostering creativity in management education. As practical implications, the authors noted that the integration of ChatGPT into teaching strategies has the potential to improve active learning, critical thinking, and creativity. Educators can utilize this AI tool to diversify instructional methods and accommodate diverse learning styles. However, the practical implementation of AI in the classroom necessitates meticulous consideration of infrastructure, training, and ongoing support for both educators and students. Furthermore, institutions should proactively tackle ethical concerns and establish guidelines for the responsible use of AI in education (Leelavathi & Surendhranatha, 2024, pp.1-16).

Exploration the theoretical foundations of both AI-driven education and Self-Determination theory, Ellikkal and Rajamohan (2024) demonstrated AI-driven personalized learning transformative impact on management education. It positively influences students' autonomy, competence and relatedness, fostering engagement. Autonomy is a key driver, strongly linked to improved academic performance. They showed that AI's pivotal role in reshaping educational experiences and intrinsically motivating students (Ellikkal & Rajamohan, 2024, pp.1-17). Insights from student and teacher perceptions offer valuable pedagogical implications for AI's role in management education. As practical implications, the integration of ChatGPT into teaching strategies has the potential to improve active learning, critical thinking, and creativity. Educators can utilize this AI tool to diversify instructional methods and accommodate diverse learning styles. However, the practical implementation of AI in the classroom necessitates meticulous consideration of infrastructure, training, and ongoing support for both educators and students. Furthermore, institutions should proactively tackle ethical concerns and establish guidelines for the responsible use of AI in education.

Examining the role of AI tools in facilitating the accessibility and usability of electronic resources (e-resources) in academic libraries, Mosha (2025) concluded that Chatbots were identified as preferred AI tools for accessing and enhancing the usability of these resources. However, among the challenges reported was the inability to integrate AI tools with the existing library management systems. Improving e-resource discovery and access can significantly enhance the effectiveness of AI tools in academic libraries (Mosha, 2025).

Higher education institutions are leveraging on these tools to enhance student learning process and student engagement (Jaladi, 2024). Cook et al. (2024) identifies several areas of AI innovation, including AI tutoring systems, feedback systems for student papers, utilization of AI for innovative lesson plans and the use of AI to predict potential student dropout from a course or institution.

Thanks to the functionalities supported by AI, AI's tools represent a renewed learning tool capable of responding to two of the fundamental aspects of the education of the future: personalization and adaptation. The combination of learning management system (LMS) and AI resulted in Smart LMS (SLMS). By collecting information on learner preferences, their states emotional and cognitive, their successes and their objectives, a SLMS can implement the most effective teaching strategies effective (specific types of assessment, collaborative learning, etc.) so that learning is most fruitful in the field specific to the knowledge studied (De la Higuera & Iyer, 2024).

Fardinpour et al. (2014) present a SLMS as LMS capable of providing the learner with the most effective learning path and the most appropriate learning content, through automation, adaptation of different strategies teaching (scaffolding), reporting and generation of knowledge. It also offers learners the opportunity to track and monitor their learning and goals learning. Additionally, although these features and tools enable the LMS to operate more intelligently, a SLMS must provide learners with the ability to opt out of AI that manages their journey to have full access to all materials learning in the learning environment.

Reiss (2021) recognizes that AI offers the hope of increasing personalization in education, but it is accompanied by risks of learning becoming less social. We shall learn from previous introductions of new technologies in school to help maximize the likelihood that AI can help students both to flourish and to learn powerful knowledge. AI has the potential to be transformative in education, and it may be that such benefits will first be seen for students with special educational needs (Reiss, 2021, p.3).

Gupta & al. (2024) concluded that AI has the potential to revolutionize various aspects of education due to its rapid expansion in educational technology by introducing personalized and efficient learning experiences. They demonstrated the effectiveness of AI tools in enhancing student engagement, personalizing learning experiences, and optimizing assessment processes.

African Union states that AI has the potential to facilitate higher-level thinking if it is guided by appropriate instructional design and supports the formative assessment of core skills. AI is integrated into Tutoring Systems (ITS), which adapt and present personalized content and learning paths based on data-informed analyses of learning processes. It is also possible to use AI to help students with disabilities. The design and development of assistance algorithms and AI tools must therefore be encouraged. Examples include voice assistants that allow students with reading difficulties to search for books using only voice commands, AI-powered screening tools that can help identify dyslexia early, and AI and augmented reality applications that can help children with hearing difficulties read by translating text into sign language. AI applications have the potential to support teachers' administrative tasks, such as automating attendance recording, grading homework, and using chatbots to repetitively answer standardized questions. Long-term investment in AI human capital must start at the primary education level and continue through secondary and tertiary education and, more importantly, into the workplace.

Exploring the potential for AI to benefit educators, students and teachers, the latest report – *Shaping the Future of Learning: The Role of AI in Education 4.0 (2024)* of the World Economic Forum – highlights four key promises that have emerged for AI to enable Education 4.0 :

(i) Supporting teachers' roles through augmentation and automation

The global teacher shortage poses a formidable challenge to improving educational outcomes, with the demand for educators projected to surge in the coming years. Integrating AI into education can streamline administrative tasks, giving teachers more time for meaningful student engagement. By automating routine duties and emphasizing human-centric teaching, we can create an environment where educators can thrive, creating a richer learning experience. However, teaching involves more than imparting information – AI should augment, not replace teachers' role.

(ii) Refining assessment and analytics in education

The integration of AI in education holds promise in revolutionizing the assessment and analytics landscape. AI-enabled assessments offer educators invaluable insights, from pinpointing learning trends to supporting the evaluation of non-standardized tests. By leveraging AI capabilities, educators can expedite the assessment process, offering timely feedback to learners and facilitating more focused engagement. Through real-time analysis, educators can identify strengths and weaknesses in student performance, allowing for targeted instructional strategies.

(iii) Supporting AI and digital literacy

Many education systems struggle to address the growing digital skills gap, crucial for students' employability and ethical tech use. Bridging this gap is imperative to cultivate an AI-ready workforce.

AI presents an avenue through which students can improve digital literacy, critical thinking, problem-solving and creativity, preparing learners for future job demands. Integrating AI into education, through traditional or innovative methods, is key to shaping tomorrow's workforce.

(iv) Personalizing learning content and experience

Extensive research confirms that individual tutoring significantly boosts learning outcomes, with tutored students consistently outperforming 98% of their peers in traditional classroom settings. However, providing personalized tutoring for every student poses a major economic challenge. AI offers a solution to this hurdle. By harnessing AI, we can now tailor the learning experience to the individual, enhancing academic performance while seamlessly catering to diverse learning needs. Customizable interfaces emerge as invaluable assets, particularly benefiting neurodiverse students and those with diverse physical abilities.

Use of AI in education management: overview of some issues

Education systems stakeholders are raising genuine concerns about ethical issues surrounding these platforms like plagiarism, reduced attention span of students. Reliance on these tools may limit the creativity of faculty and students, their adoption in higher education comes with challenges such as ethical considerations and the need to address equity and inclusion issues to ensure that all students benefit from AI advancements (Jaladi, 2024; Abdelkader & al., 2024).

Anand & al. (2024) also identified ethical, privacy, and equity concerns as the mains issues that in one way or another are associated with the use of AI in learning situations. The journalist and author, Remis Demichelis (2024) affirms that far from the dream of neutrality attached to it, AI reproduces or even amplifies human biases. AI reproduces and amplifies ethnic and gender stereotypes. For him, algorithms are never innocent, because the algorithm not only reproduces the bias inherent in society but on top of that, it overweights it and will reinforce it.

Analysing the impact of Generative AI on critical thinking skills and practices, Lee & al. (2025) found that: quantitatively, when considering both task- and user-specific factors, a user's task-specific self-confidence and confidence in GenAI are predictive of whether critical thinking is enacted and the effort of doing so in GenAI-assisted tasks. Specifically, higher confidence in GenAI is associated with less critical thinking, while higher self-confidence is associated with more critical thinking. Qualitatively, GenAI shifts the nature of critical thinking toward information verification, response integration, and task stewardship (Lee & al., 2025, pp.1-23).

The first Global Index on Responsible AI[3] (2024) revealed that global progress toward responsible AI is lagging far behind the development and adoption of AI. There are major gaps across many parts of the world and in many core areas of responsible AI, especially those areas related to protecting the rights of vulnerable or marginalized groups (Adams & al., 2024, p.12). The authors identified key take-aways as follows:

(i)   AI governance does not translate into Responsible AI

(ii)   Mechanisms ensuring the protection of human rights in the context of AI are limited

(iii)   International cooperation is an important cornerstone of current responsible AI Practices

(iv)   Gender equality remains a critical gap in efforts to advance responsible AI

(v)   Key issues of inclusion and equality in AI are not being addressed

(vi)   Workers in AI economies are not adequately protected

(vii)   Responsible AI must incorporate cultural and linguistic diversity

(viii)   There are major gaps in ensuring the safety, security and reliability of AI systems

(ix)   Universities and civil society are playing crucial roles in advancing responsible AI

(x)   There is still a long way to achieve adequate levels of responsible AI worldwide.

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[3] The Global Index on Responsible AI is a multidimensional tool measuring progress towards responsible AI in 138 countries and jurisdictions. It measures government commitments and country capacities towards the responsible development of AI, through a technical, social and political lens. Moving beyond the parameters of innovation and investment, the Index fills critical data gaps by employing human-rights based benchmarks, and covering continents and countries not usually found in a study of this kind.

These gaps are identified by other actors over the world. Journalist and author, Remis Demichelis (2024) asserts that far from the dream of neutrality attached to it, artificial intelligence reproduces, or even amplifies, human biases. Artificial intelligence reproduces and amplifies ethnic and gender stereotypes. For him, algorithms are never innocent, because the algorithm not only reproduces the bias inherent in society but also exaggerates it and reinforces it. This is particularly true if AI tools should generate content based on data that contain ethnic and gender stereotypes.

INSIGHTS FROM INSTITUTIONS

Many efforts to promote responsible AI are embedded in broader government AI strategies which lack specific measures related to human right considerations, such as gender equality (Adam & al., 2024) and education. This trend highlights the need for comprehensive policies, recommendations, and guidelines based on human-centered approaches, with particular attention to human rights. For Adams and al (2024), as international cooperation on responsible AI is an area of shared commitment between countries around the world, there is a key lever for strengthening the role of global communities monitoring responsible AI progress in practice. This is particularly relevant and needed in education sector as some practices and content remain universally shared by the educational communities around the world.

On the occasion of its international conference on the theme *"Principles for AI: towards a humanist approach"*, held in March 2019 in Paris, UNESCO called for a more humanist approach to the application of AI which aims to direct the development of policies and practices in AI and education towards the protection of human rights and the acquisition of the values and skills necessary for sustainable development and effective collaboration between the individual and the machine in life, learning and work. To do this, UNESCO recommends, among other things, ensuring that AI is controlled by humans and focused on serving people, and then that it is developed in a way that strengthens the capacities of students and teaching staff. AI applications should also be designed "ethically, non-discriminatory, fair, transparent and auditable.

For Leelavathi & al. (2024), the practical implementation of AI in the classroom necessitates meticulous consideration of infrastructure, training, and ongoing support for both educators and students. Furthermore, institutions should proactively tackle ethical concerns and establish guidelines for the responsible use of AI in education.

The World Economic Forum (2024) supports that to make sure that new technologies fulfil their potential to enhance Education 4.0 and lifelong learning, we need to deploy them strategically and safely, taking into account the following factors:

(i) Design for equity

Recognizing AI's potential to exacerbate current education gaps, AI-enabled educational innovations must prioritize equity in their design. That means addressing disparities between genders, public and private schools, as well as catering to children with diverse abilities and learning styles, while removing language and access barriers.

(ii) Enhance human-led pedagogy

AI will never replace high-quality, human-led pedagogy. To that end, most examples focus on enhancing human-led teaching by providing the right AI tools that automate clerical tasks and alleviate teachers' time to focus on their craft or by providing relevant training about AI skills that help them better deliver lessons on AI.

(iii) Co-design and implement with supporting stakeholders

AI-enabled innovations in education should acknowledge the critical roles played by teachers, parents and educational institutions in adopting this emerging technology. Successful instances of AI integration in education underscore the importance of collaboratively designed educational solutions with input from students, teachers and experts. This collaborative, multi-stakeholder approach ensures that solutions meet the practical demands of the classroom, align with national curricula, remain abreast of industry trends and implement safeguards to protect student data.

(iv) Teaching about AI is equally crucial to teaching with AI

AI tools e.g. those that provide data analytics and gamified learning – have long been part of the educational landscape. While developments in generative AI offer new opportunities to leverage AI tools, it becomes increasingly evident that teaching about AI in schools is vital. This education should prioritize imparting skills related to AI development and understanding its potential risks. These skills are critical for shaping future talent capable of ethically designing and developing AI tools that benefit economies and societies.

(v) Economic viability and access

Ensuring economic viability and access to AI-learning opportunities for all learners, is essential to prevent deepening the existing digital divide and avoid creating new disparities in education. The realization of AI promise in education requires substantial investment, not only in the products themselves but also in supporting infrastructure, training and data protection. By addressing these critical aspects, we can unlock the full transformative potential of AI to improve educational outcomes for learners worldwide.

CONCLUSION AND RECOMMENDATIONS

In conclusion, we note that AI brings many advantages in the process of content generation, learning and management of the education system. To make the most of AI, it is crucial to ensure its use is regulated in the education sector, taking into account ethical requirements and respect for privacy. More broadly, the supervision of AI by a policy, an appropriate strategy at the national level is also necessary to generalize its healthy application.

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