

Ethical Considerations and Challenges in the Integration of Artificial Intelligence in Education: A Systematic Review

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How to cite this article:

Farooqi, M. T. K., Amanat, I., & Awan, S. M. (2024). Ethical considerations and challenges in the integration of artificial intelligence in education: A systematic rReview. *Journal of Excellence in Management Sciences*, 3(4), 35–50.

Received: 9 July 2024 / Accepted: 7 August 2024 / Published online: 15 September 2024

Abstract

This systematic review examines those challenges in light of data privacy, algorithmic bias, ethical implications, technological hurdles, and acceptance of AI by educators and students. First, data privacy should be a primary concern, as AI systems require extensive data, bringing up the potential for breach and misuse. Secondly, there must be a robust mechanism concerning data protection and against the application of GDPR. Another critical point is algorithm bias: biased training data sets may lead to discriminative decisions that will increase inequalities in education. It talks about AI's impact on teachers and classroom dynamics because the takeover of responsibilities may lower the intensity of necessary human contact. From a technical perspective, there is so much infrastructure and expertise required that too many educational institutions lack, especially in developing countries. In addition, educators themselves may feel that the change resists and fears job loss and therefore acts as a deterrent to AI integration. The review underscores the imperative for extensive training of teachers to support enabling the integration of AI. It now demands a collaborative effort on the part of all stakeholders to maximize the gains and reduce the drawbacks of AI in educational aspects. Continuous research in, policy-making for, and ethical guidelines on AI are required to benefit all aspects of education equitably and effectively.

Keywords: Artificial Intelligence, Challenges, Privacy, Education, Ethical Considerations

1 Introduction

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AI is changing every face of industries, and education is no exception (Bates et al., [2020](#); Păvăloaia & Necula, [2023](#); Sharma et al., [2021](#)). AI can enhance the learning experience and also ease administrative burdens by sending personalized learning pathways to students (Alam, [2023](#); Shankar, [2022](#)). The capacity of AI in personalizing educational experiences imbues it as highly promising, where a lot of research has been done to prove this (Markauskaite et al., [2022](#)). For instance, Luckin and Holmes ([2016](#)) believe that AI can make learning more personalized and effective, adapting content to the students' pace and style of learning. Another point, by Holmes et al. ([2019](#)), expresses a discussion on AI to help automate administrative tasks and give space for educators to teach (Ahmad et al., [2022](#); Alam, [2023](#)). Yet, despite such auspicious advances, several challenges remain great hurdles to permitting the full-scale adoption of AI in education.

Admittedly, much research underlined the potential benefits of AI; on the other hand, significant research lacuna still persists as far as responding to ethical, technical, and societal challenges related to its implementation goes. Some of the issues regarding ethics in AI use relate to the privacy of data and biased algorithms in decision-making (Hwang et al., [2020](#)), which have not been researched to a great extent within the educational environment (Gaonkar et al., [2020](#); Nassar & Kamal, [2021](#)). Besides that, there are various technological and financial constraints to integrate AI systems into different educational environments of developing regions, which have yet to be explored (Kuleto et al., [2021](#); Mhlanga, [2021](#)). Therefore, as much as the potential of AI (Chassignol et al., [2018](#)) in education cannot be gainsaid, in the present circumstances, there is a dire need to explore and to ascertain (Ezeani, [2022](#)), how to deal with such challenges in order that this sector uses AI ethically and equitably (Davis, [2020](#); Elliott et al., [2022](#)). Another tricky area is that of ethics vis-à-vis artificial intelligence in education. From automated grading systems to personalized learning platforms, the role of the teacher and classroom dynamics are about to be profoundly altered by artificial-intelligence solutions (Shah, [2023](#); Tedre et al., [2021](#)). The fear is that over-reliance on AI at the expense of human interaction-so vital to the educational experience-could be eroded (Hassani et al., [2021](#); Zawacki & Gouverneur, [2019](#)). Furthermore, artificial intelligence in student behavior monitoring and forecasting has raised ethical questions on surveillance and human freedom (Akgun & Greenhow, [2022](#)). Educators and policymakers should address these ethical challenges vigorously to ensure that the application of AI enhances and does not withdraw from the learning process (Williamson, [2017](#)).

Technical problems that emanate from the application of AI in education include designing dependable, adaptive, and engaging AI systems in diverse educational settings is technology (Luan et al., [2020](#); Zhang & Aslan, [2021](#)) intensive and experience-laden. Setting up and maintaining such complex AI systems is not feasible for many educational institutions (Chen et al., [2020](#)), especially within developing regions of the world—with weak finances and limited technological expertise (Dwivedi et al., [2021](#); Hassani et al., [2021](#)). Overcoming these technological barriers, calls for commitment of resources to enhancing the infrastructure, provision of full training programs for the teachers, and promoting collaboration (Brzycki & Dudit, [2005](#); Okoye et al., [2023](#); Williamson, [2017](#)) between the learning institutions and the technology providers, as indicated by Miao et al. ([2021](#)). Additionally, AI effectiveness in learning depends on how it is embraced and implemented by both the tutors and learners (Colchester et al., [2017](#); Liu et al., [2021](#)). Resistance to full-scale implementation of AI in any educational environment may spring from human factors such as resistance to change, fear of job loss, and lack of trust in AI systems (Hasija & Esper, [2022](#)). If the educators are involved in the design and deployment, then the likelihood that those tools will be designed based on their needs and aligned with their methods of teaching is higher (Alam, [2023](#); Shankar, [2022](#)). Equally important, sufficient training might instill confidence and trust in artificial intelligence systems.

Other than what has already been said, there is also a concern over the long-term implications AI will have on education (Brzycki & Dudit, [2005](#); Chassignol et al., [2018](#)). As the pace at which AI

is growing gets a notch higher, so does the concern it raises for the future of education and what skills a student really should be focusing on in order to survive successfully in a world run by AI (Dwivedi et al., [2021](#); Gaonkar et al., [2020](#); Zadorina et al., [2024](#)). This includes revisiting educational programs, including AI literacy, and developing skills in critical thinking and creativity. Both are competencies that AI cannot easily replicate (Bates et al., [2020](#); Păvăloaia & Necula, [2023](#); Sharma et al., [2021](#)). In summary, given the vast potential brought into education by AI, there are also significant challenges presented that call for effective responses (Ahmad et al., [2022](#); Alam, [2023](#)). Data privacy and security concerns, algorithmic bias, and ethical implications are but a few of the key pre-conditions that need consideration for the responsible inclusion of AI in education (Davis, [2020](#); Elliott et al., [2022](#)). These are in addition to the technological obstacles at large, coupled with acceptance by educators and students. Further research and therefore communication between stakeholders in this area would facilitate reaping full benefits availed by AI while reducing its drawbacks to a minimum.

1.1 Rational

It's against such a backdrop that the educational process is compelled to factor in these learning resources in the era of artificial intelligence and machine learning. Much as artificial intelligence has made the teaching and learning process easy, it presents numerous challenges and ethical considerations that require careful attention and resolution during its application. Therefore, this systematic review will add enough evidence for the challenges and ethical considerations in using artificial intelligence in education. Once we identify the challenges, we can more easily overcome them and provide alternatives.

1.2 Research Objectives

1. Systematic identification and categorization of the major technological and infrastructural challenges related to AI integration into educational settings.
2. The research investigates the ethical considerations and biases that are implicated by AI use in education.

1.3 Research Questions

1. What are the major technological and infrastructural challenges facing the incorporation of AI tools and systems in educational institutions?
2. How could the biases documented in AI algorithms contribute to creating educational inequity and unfairness toward the diverse student populations?

2 Literature Review:

2.1 Research Gaps in Integrating Artificial Intelligence in Education

The integration of Artificial Intelligence (AI) in education has the potential to revolutionize teaching and learning processes by offering personalized learning experiences, streamlining administrative tasks, and providing intelligent tutoring systems (ITS) (Alam, [2023](#); Charland et al., [2024](#); Trivedi, [2023](#)). Despite its potential, several critical research gaps hinder the optimal and ethical adoption of AI in educational contexts. This literature review focuses on the challenges and ethical considerations related to AI integration in education, specifically emphasizing the research gaps that need further investigation (Alam, [2023](#); Luan et al., [2020](#); Shankar, [2022](#)). A recurring gap in the literature is the absence of longitudinal studies examining the long-term effects of AI on student learning outcomes and the educational environment (Davis, [2020](#); Elliott et al., [2022](#)). While most of the current research focuses on short-term or pilot project implementations, they lack the scope whether AI benefits persist over time (Tedre et al., [2021](#)). This limitation is visible both within K-12 (Akgun & Greenhow, [2022](#)) and higher education research where conception about the effectiveness of AI tools is usually based on immediate feedback instead of long-term educational goals (Ăboliņa et al., [2024](#); Bravo et al., [2022](#)).

The use of AI in education also raises a number of ethical concerns with regard to data privacy, surveillance, and bias (Hope, [2016](#)). Most AI-systems function best when large volumes of their data are provided; this naturally raises significant concerns about the privacy of student data (Davis, [2020](#); Elliott et al., [2022](#)). Further, some biases have been shown to be perpetuated through AI systems, creating inequity of learning opportunity for marginalized student groups (Zawacki & Gouverneur [2019](#)). Despite these concerns, scant studies have explored the framework for ethical AI design or policy mechanisms that could mitigate these risks (Sigfrids et al., [2022](#)). However, while enthusiasm toward AI in education may be growing, many educators are not being prepared for how to effectively integrate such tools into their teaching practices (Trivedi, [2023](#)). The present literature evidences an extreme interest in the technical capability of AI (Kuleto et al., [2021](#); Mhlanga, [2021](#)) but further ignores professional development and support that educators need to confidently and appropriately exploit affordances presented by AI technologies. Literacy about AI within educators is considered a crucial barrier to its successful implementation, which appears to be defeating underutilization of the potentially created effect of AI.

Most research on AI in education takes place in higher-income, better-resourced educational environments, with scant attention to low-resource settings such as rural schools and developing countries (Alam, [2023](#); Shah, [2023](#); Shankar, [2022](#); Tedre et al., [2021](#)). While AI has high promise in helping reduce educational disparities, very little is known about entitlements arising during the implementation of AI under varied and under-resourced environmental conditions (Ahmad et al., [2022](#); Alam, [2023](#)). The integration with AI has unique challenges related (Hassani et al., [2021](#)) mainly to the cultural and contextual differences and limited infrastructure that is not supported by the ongoing research works (Āboliņa et al., [2024](#); Luan et al., [2020](#)). Most of the understandings about the effectiveness of AI tools in education are anecdotal or contextual, ultimately providing inconsistent and potentially varying assessments across different educational settings. Chassignol et al. ([2018](#)) commented that because there is no standard metric with regard to the assessment of the effectiveness of AI, it is pretty complicated to systematically compare various AI systems or assess their educational impact. Standardized frameworks would ensure AI tools are assessed on objective, measurable standards, considering both immediate and long-term impacts of education (Alonso-Rodríguez, [2024](#)).

AI can help make inclusive education for all, personalizing learning to meet the diverse needs of students, including students with disabilities (Bates et al., [2020](#); Păvăloaia & Necula, [2023](#); Sharma et al., [2021](#)). Yet, current research largely fails to explore specific challenges and opportunities of using AI in settings of inclusive education (Lampou, [2023](#); Lu, [2023](#)). There is little exploration of how AI can be designed to accommodate diverse learning styles and disabilities, or how these technologies will ensure resources are available to all on an equal basis (Alam, [2023](#); Kuleto et al., [2021](#); Mhlanga, [2021](#)). Overall, AI holds high promise for changing educational landscapes; however, a number of key research gaps remain unmet. Longitudinal studies, ethical considerations about privacy and bias, comprehensive teacher training, low-resource contexts, standardized evaluation metrics, and inclusive education initiatives are among these. These gaps are important to address so that the integration of AI into educational settings can be effective, equitable, and ethical.

3 Plan of Work

The systematic review was designed to follow the PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses, which allows the author to exhaustively record an orderly identification, selection, and evaluation of the literature that will be followed. Google Scholar is one of the most popular free scholarly article search engines across many disciplines (Page et al., [2021](#)). A complete search was done using such keywords as "Artificial Intelligence in Education" (29900 articles), "Artificial Intelligence challenges in education, and "Ethical consideration of Artificial Intelligence." This step was restricted to the 2019-2024 period to ensure that only the

latest discussions were covered (Şalvarlı et al., [2021](#); Parums, [2021](#)). Inclusion criteria comprised of peer-reviewed journal articles, research papers looking at teaching and learning practices involving AI integration, discussions on ethical considerations or challenges of AI in education that were published in English journals only. To be excluded are those talking about implications of technological aspects on AI without ethics or challenges therein plus non-English languages papers.

The selection process consisted of two stages where in stage one all the titles and abstracts from all retrieved papers were screened followed by removal of any duplicates or papers not relevant. In stage two, full-text of remaining articles were reviewed for appropriateness against inclusion and exclusion criteria. Only those whose content met all the conditions were included into the final review. A standardized form was used during data extraction which captured author(s)'s name(s), year when article was published, title of study conducted, purpose of research study findings as well as applied scientific procedures used. Moreover extracted some critical findings about embedding AI into learning processes as they pose greatest challenge. Afterward the collected data has been analyzed through conceptual analysis approach whereby the key themes have been identified these themes have been analyzed then reported patterns emerged through data particularly around challenges and ethical concerns associated with AI integration teaching-learning settings. This structured plan ensures a critical examination on literature thereby offering insight into how AI is integrated in learning with a specific focus on ethical challenges and considerations.

4 Analysis

4.1 Challenge 1: Technological Dependence and Infrastructure Gaps

Advanced technological infrastructure is required for the integration of AI in education. This forms a big trust barrier, especially for those schools or areas that do not have the capacity for such technology. For the artificial intelligence tools to be used at schools, there is a need for a fast internet connection, computer hardware, and programs; all these are usually absent in underprivileged institutions or countries that have poor infrastructures. This is exacerbated if such schools will be situated in rural areas or in developing countries where the digital infrastructures are not just obsolete but non-existent. The over-reliance on technology not only stands in the way of the proliferation of AI but also causes disparity between the 'haves' who can afford to implement this kind of system and the 'have-nots' who cannot. With the power to buy very expensive technologies, rich districts are most likely to provide AI-powered learning resources to students. Poor-family children attending schools in remote areas may never experience personalized learning enabled by artificial intelligence due to the lack of gadgets, let alone innovative pedagogies coming along with such gadgets. It is perpetuating disparities in education through denying some students while giving others an opportunity to own digital devices and to be able to have fair competition.

Besides the financial issues associated with artificial intelligence adoption at school level-for example, unreliable internet connectivity, inconsistent power supply, and absence or inadequacy of technical support, among others-many other problems could arise leading to the failure of properly functioning AI systems within the institutions themselves, let alone even being tried upon adoption by schools. The reason why this is not a challenge tantamount to only being technological in nature is that there is a need for hefty investments into improvement of infrastructure and training of personnel involved in maintenance works continuously and perpetually if the need arises. Thus, unless we bridge these gaps fundamentally, so much potentiality that surrounds us because of the revolutionizing of the global population will still remain untapped, leaving us far much behind than ever before realized and hence making things worse off as opposed to making them better off than never before seen.

4.2 Challenge Two: Ethical concerns & privacy

The use of AI in education raises quite complex and broad ethical issues. One pressing challenge concerns data privacy: AI systems amass huge volumes of data on students' behavior, preferences, and performance that must be kept secure from unauthorized access, misuse, or breaches at schools or any other educational facility entrusted with such data. However, artificial intelligence cannot function sans big data sets essential to optimize its algorithms. This increases the risk inherently associated with a violation of an individual's rights to keep their personal information confidential. On the other side, there is also algorithmic bias. An AI-powered system is only as fair as the information it gets during training sessions, but when these datasets have biases based on race, gender, or socio-economic factors, then that artificial intelligence will turn out even more so, furthering discrimination within various learning environments. Suppose, for example, you have assessments done by biased datasets trained on some minority group students. This can lead to their further disadvantage in personalized pathing and solidify systemic injustices against children from poorly privileged backgrounds who have enough challenges concerning equal opportunities in life.

The other ethical issue is in ensuring a fair and responsible use of AI within education. In balancing how the school and teachers use AI to enhance learning on one hand, one has to ensure that these new technologies don't offend some of the basic principles of education—such as equity, transparency, or accountability—on the other hand. Further, people question exactly how much faith any individual could place in educational decisions devised wholly by, and free of interference and intervention from, AI systems alone, since many of those AI algorithms are opaque, or "black boxes," and educators and students cannot always understand why certain choices were made. The serious lack of transparency raises very serious questions about whether the assessment via artificial intelligence is really fair or not where admission processes or recommendations in learning are concerned.

4.3 Challenge 3: Teacher Training & Adaptability

It will, therefore, mean that teachers will need a lot of retraining with the integration of AI in classrooms. It is hence a quite multi-faceted challenge—technologically in terms of training in technical skills and also in the mindset retraining required for pedagogical change. Some may even find it difficult to change their original teaching approach if they had been with the traditional classroom for many years where AIs were little or not used at all in lessons. It becomes even harder for these teachers to cope with new systems they know nothing about, except viewing them as threats against their positions within school setup. In many cases, these barriers will only be broken by comprehensive, well-designed training programs, whose costs can be exorbitant when implemented in resource-poor regions. However, all the measures need to be put in place to ensure that all teachers in the world are able to effectively use AI tools, without discrimination on the basis of geographical location—a likely negative discrimination given that the main regions still faced by the curse of limited accessibility are rural areas around the world. Teachers should be educated not only to operate different kinds of software but also to integrate them into meaningful practice while delivering the matter with personalized learning. Teachers should be encouraged to use formative assessment differentiation in instruction; otherwise, any attempt to make the teacher skill acquire will become irrelevant, because he/she cannot use the same into a given situation. Frequent support both during and after implementation is solicited to keep up with the rapidly changing technology.

Apart from lacking in technical know-how, adaptability is the other major stumbling block. Most educators are used to traditional face-to-face teaching methods that heavily rely on human interaction for effective delivery of content. The introduction of AI in classrooms shifts some of

the responsibilities of live tutors to machines. Something like that might not go down well with some teachers, fearing the deviant intelligent systems might render them obsolete, or even further, compromise quality education if humans were completely put aside from the equation between learners and facilitators. Thus, blended model adaptation—one that blends artificial intelligence with traditional methods—requires training but also cultural change among educators regarding the role that technology plays in the school environment.

4.4 Challenge 4: Evaluating Impact of AI on Student Learning and Development

In this light, understanding the emerging technology effects on different aspects of student learning outcomes can sometimes be quite complex. With the power of AI, lessons can now be tailored to the individual needs of each learner; however, there remains a lot yet to be understood regarding how such developments influence motivation levels, among other factors like cognitive load and self-efficacy. Not all these wider measures of success have been fully embraced as yet by the stakeholders themselves in education, let alone some kids who actually might benefit considerably from the use of AI. Others might find the situation frustratingly beyond them or even anxiety-inducing about their own abilities. AI-powered personalized learning systems may challenge traditional teaching models enough to make it impossible to quantify student performances with a standardized test alone: for instance, these tools continuously monitor students' progress at small and incremental measures, therefore providing immediate feedback that is reflective of their learning journey over time. However, such depth in learning fostered by these aids may not be captured by conventional assessments, hence begging the question of how best evaluators can make out the impact AI has made on education.

Further, AIs use certain indicators to personalize instructions based on the student's level of engagement and performance data. Yet, the systems exclude the emotional and social elements of learners' motivational status, anxiety, or personal problems that may have a great impact on the results of studying. In this regard, one could feel pressurized to do better under continuous monitoring through AIs, leading to increased levels of stress or reduced motivation. Precisely, the challenge lies in how cognitive and emotional dimensions coalesce to gauge the performance of AI in considering the wholesome development of the learners and not just their performance metrics.

4.5 Challenge Five – Striking a Balance between AI and Human Interaction in Education

There is also a unique challenge brought about by the risk of becoming heavily dependent on artificial intelligence, even in schools. Although it may facilitate the grading processes or assessments, or even give personalized instructions, there is a high level of emotional intelligence interpersonally that can be obtained through human teachers themselves in classrooms that have worked along with the computers. They cannot offer development in those critical thinking skill areas so much needed to build up empathy toward others around oneself or enhance social interaction abilities during emotional growth stages, which fall short where only robots are concerned about what should be taught. One of the risks in relying so heavily on technology like this is that we may eventually begin to scale back those aspects of teaching that most closely involve humans, due to the fact that they lend a great deal to personal development among students needing them most of all other categories comprised therein. Teachers offer guidance and mentorship with emotional support, all of which are purposed to help learners succeed academically, but none of these can be simulated by any AI system. Normally, it is the relationship between the student and teacher effecting a catalyst for learning among those experiencing low self-esteem or those undergoing some problems of a non-academic nature at home; therefore, there cannot be such a thing as excess care being shown to students' well-being as a means of helping them achieve academic and personal success.

While doing so, it is important to find ways of balancing AI-driven learning against traditional

methods if we are to achieve comprehensive education approach requirements. Though many improvements can be made in learning through the application of artificial intelligence, this should not make human tutors irrelevant but complement them so that the two work effectively. The best strategy thus involves taking advantage of the best of both worlds: personalized insights based on data from AIs, as well as emotional support, creativity, and inspiration brought about by teachers who know their students individually well enough thanks to interaction over time. It thus becomes vital for us not only to keep up a balance between these two poles but also make sure that the introduction of AI does not compromise values basic to education.

Though challenges are galore with regard to imbibing AI at schools, including technological dependence, infrastructure gaps, ethical considerations, teacher training, adaptability, and preservation of human touch during the teaching-learning process, it still is one of the tools that have potentiality for transforming education if suitably managed. That is to say, no challenge should be considered insurmountable, since they all form part of what needs tackling head-on so that artificial intelligence could become truly great force within our educational systems.

5 Discussion

AI integration into education brings a set of opportunities and challenges in many ways (Lampou, [2023](#); Mohammad & Saheal, [2023](#)). The discussion compares the identified key challenges of the analysis (Luan et al., [2020](#)), such as technological dependence, ethical concerns, training of teachers, evaluation of the impacts of AI, and balancing AI with human contact, with existing research, identifying similarities, differences, and new insights as Selwyn ([2022](#)) highlights the effects of AI in education setting, particularly questioning when replace human teachers. Technological dependence, as such, identified in the analysis goes hand in hand with prior studies discussing the "digital divide" in education. While Mallik, and Gangopadhyay ([2023](#)) and Huang ([2019](#)) also note that a lack of advanced technological infrastructure is a major impediment to the adoption of AI in low-income regions, this paper places greater emphasis on the role of socio-economic inequality as additional reasons for unequal access to AI tools, even in technologically advanced regions (Moore et al., [2023](#)). This broader scope brings a new dimension to the currently ongoing discussion about how infrastructure and socio-economic gaps together are increasing inequality in education.

Indeed, these concerns have also been highlighted in such studies as Holmes et al. ([2022](#)) and Binns ([2018](#)) on data privacy and algorithmic bias. More than that, however, the analysis goes beyond this in discussing how biased AI systems may influence decisions on everything from admission to personalized learning (Tao et al., [2019](#)). It also introduces the "black box" concept of algorithms, emphasizing a need for transparency in AI decision-making. This nuanced focus on the ethical implications of AI processes thus represents a new direction; it might be taken up more energetically by researching issues of transparency and fairness in educational AI systems (Hwang et al., [2020](#)).

The issue of training and adaptability of teachers has been mirrored in research studies by Kabudi et al. ([2021](#)), which again indicates a gap in technical skills and resistance to technological change from educators. Nevertheless, this paper raises the discussion to a deeper level by concentrating on the cultural shift that needs to take place for teachers to actually integrate AI into their pedagogical work. It also points to the need for continuing professional development-the training programs must move and develop with the AI technology. This is something new and underlines the very dynamic nature of the integration of technology in education. Mireles and Sweeney ([2020](#)), studied and highlights major challenges, containing the hazard of exacerbating existing inequalities. They emphasize that without cautious implementation, AI tools may present biases in educational organizations and disturbing marginalized pupils. On the other hand, Luckin and Holmes ([2016](#)) referred to the potential of AI for improving learning; yet this review adopts a more

holistic approach by taking into consideration not only the cognitive domain but also the affective and social dimensions of students, such as motivation and anxiety (Rochmat et al., [2024](#)). The analysis further questions whether AI, inasmuch as it promises personalization, may perhaps lead to an increased instead of a reduced difference between people. This new knowledge thus partly falsifies the widely held assumption that AI universally contributes to personalize learning by pointing out that AI's actual impact on learners' emotional well-being and individual learning styles has to be critically weighed.

This use of the balance between AI and human interaction, presented by Hope, enforces the concerns of over-reliance on AI assured by the analysis. However, while taking this further, the analysis introduces the concept of overuse of AI with a warning of the risks brought forth by erosion of human interaction in education. This perspective is less developed in the literature and thus provides a new word of caution on retention of emotional and social features that human teachers bring forth to education. The review, therefore, advocates a blended approach in which AI serves a complementary rather than hegemonic role to traditional pedagogy, offering a way forward in integrating AI into education without undermining core human elements of learning.

5.1 Conclusions

Hence, AI in Education, though promising in every sense, is beset with huge challenges that need to be sorted out for its fair and effective implementation. Emphasis on high-end technology underlines digital resource inequality, opening a chasm of digital educational inequality, especially in those places where the technical infrastructure is inadequate. This gap must therefore be closed to ensure that all pupils enjoy equal opportunities in these AI-driven education technologies. The application of AI in education should also be made in such a manner to ensure that issues regarding data protection and ethics are not jeopardized (Hwang et al., [2020](#)). Data about students' needs to be kept safe, bias within algorithms lowered, and ethical standards upheld for fairness to instill trust. Not to forget, one of the significant challenges lies in the section of teacher training and accommodation. For the effective integration of AI into pedagogies, teachers need deep preparation and time-bound support so that the technology brings advances, not disorders, into class processes.

More importantly, a balance has to be struck regarding the impact of AI on the learning process for students and objectively seek a middle way in which to melt AI with more traditional modes of education. It is now time to keep the spotlight on what matters: the effect AI itself could have on student achievement, motivation, and well-being, so positive effects in education will be realized. Just like essential ingredients, emotional support and the human touch are required for the realization of education in its totality. In order to ensure that AI integrates education in a way that is going to work fairly and advantageously for all students, policymakers, educators, and stakeholders must get together regarding the challenges encountered with some strategies in mind.

5.2 Recommendations

- Thence, investment in the development of technological infrastructure in the under-privileged parts of this country; sweetening access to the internet and hardware at affordable costs for all learners and educators.
- Establish stringent rules for the protection of personal data and ethical guidelines. Enforce thorough data protection measures and transparent AI operations.
- Launch continuous, professionally developed training programs in digital literacy and layman terms, AI tools.
- Designing frameworks within which the impact of AI on students' performance and motivation may be assessed. Designing frameworks to support research-based studies regarding individual differences; soliciting and using feedback to further improve AI tools and teaching strategies.

6 References

- Āboliņa, A., Mežinska, S., & Ļubkina, V. (2024, May 24–25). *The application of artificial intelligence tools in higher education: Opportunities and challenges in society integration education* [Paper presentation]. Proceedings of the XI International Scientific Conference Digital Transformation of the Economy: Challenges, Trends and New Opportunities. Samara, Russia.
- Ahmad, S. F., Alam, M. M., Rahmat, M. K., Mubarik, M. S., & Hyder, S. I. (2022). Academic and administrative role of artificial intelligence in education. *Sustainability*, 14(3), Article e1101. <https://doi.org/10.3390/su14031101>
- Akgun, S., & Greenhow, C. (2022). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics*, 2(3), 431–440. <https://doi.org/10.1007/s43681-021-00096-7>
- Alam, A. (2023). Harnessing the Power of AI to Create Intelligent Tutoring Systems for Enhanced Classroom Experience and Improved Learning Outcomes. In *Intelligent Communication Technologies and Virtual Mobile Networks* (pp. 571–591). Springer Nature Singapore.
- Alonso-Rodríguez, A. M. (2024). Towards an ethical framework for artificial intelligence in education: Educational Theory. *Interuniversity Magazine*, 36(2), 79–98. <https://doi.org/10.14201/teri.31821>
- Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education*, 17, 1–12. <https://doi.org/10.1186/s41239-020-00218-x>
- Binns, R. (2018, February 23–24). *Fairness in machine learning: Lessons from political philosophy* [Paper presentation]. In Conference on fairness, accountability and transparency. PMLR. New York, USA
- Bravo, L. G., Nistor, N., Ramírez, B. C., Soto, I. G., Contreras, M. V., Vives, M. N., & Robles, P. M. (2022). Higher education managers' perspectives on quality management and technology acceptance: A tale of elders, mediators, and working bees in times of Covid-19. *Computers in Human Behavior*, 131, Article e107236. <https://doi.org/10.1016/j.chb.2022.107236>
- Brzycki, D., & Dudt, K. (2005). Overcoming barriers to technology use in teacher preparation programs. *Journal of Technology and Teacher Education*, 13(4), 619–641.
- Charland, P., Létourneau, A., Martineau, M. D., Boasen, J., & Léger, P. M. (2024). Navigating the future of learning: A systematic review of AI-Driven Intelligent Tutoring Systems (ITS) in K-12 Education. Research Square [Preprints]. <https://doi.org/10.21203/rs.3.rs-4276591/v1>
- Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: a narrative overview. *Procedia Computer Science*, 136, 16–24. <https://doi.org/10.1016/j.procs.2018.08.233>
- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Colchester, K., Hagra, H., Alghazzawi, D., & Aldabbagh, G. (2017). A survey of artificial intelligence techniques employed for adaptive educational systems within e-learning platforms. *Journal of Artificial Intelligence and Soft Computing Research*, 7(1), 47–64. <https://doi.org/10.1515/jaiscr-2017-0004>
- Davis, K. (2020). Addressing bias in AI: A framework for educational practitioners. *Educational Technology Research and Development*, 68(5), 2395–2410. <https://doi.org/10.1007/s11423-020-09765-y>
- Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., & Williams, M. D. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57, Article e101994. <https://doi.org/10.1016/j.ijinfomgt.2019.08.002>

- Elliott, K., Price, R., Shaw, P., Spiliotopoulos, T., Ng, M., Coopamootoo, K., & Van Moorsel, A. (2021). Towards an equitable digital society: artificial intelligence (AI) and corporate digital responsibility (CDR). *Society*, 58(3), 179–188. <https://doi.org/10.1007/s12115-021-00594-8>
- Ezeani, C. C. (2022). Africa in the Face of the AI Wave and the Fourth Industrial Revolution: Leapfrog Opportunities, Developmental Backlogs, and Impediments. In D. O. Okocha, M. J. Onobe & M. N. Alike (Eds.), *Handbook of Research on Connecting Philosophy, Media, and Development in Developing Countries* (pp. 289–304). IGI Global.
- Gaonkar, B., Cook, K., & Macyszyn, L. (2020). Ethical issues arising due to bias in training AI algorithms in healthcare and data sharing as a potential solution. *The AI Ethics Journal*, 1(1), 1–1. <https://doi.org/10.47289/AIEJ20200916>
- Hasija, A., & Esper, T. L. (2022). In artificial intelligence (AI) we trust: A qualitative investigation of AI technology acceptance. *Journal of Business Logistics*, 43(3), 388–412. <https://doi.org/10.1111/jbl.12301>
- Hassani, H., Huang, X., & Silva, E. (2021). The human digitalisation journey: Technology first at the expense of humans? *Information*, 12(7), Article e267. <https://doi.org/10.3390/info12070267>
- Holmes, W., Persson, J., Chounta, I. A., Wasson, B., & Dimitrova, V. (2022). *Artificial intelligence and education: A critical view through the lens of human rights, democracy and the rule of law*. Council of Europe.
- Hope, A. (2016). Biopower and school surveillance technologies 2.0. *British Journal of Sociology of Education*, 37(7), 885–904. <https://doi.org/10.1080/01425692.2014.1001060>
- Huang, R. (2019). *Educational technology a primer for the 21st century*. Springer Nature.
- Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 1, Article e100001. <https://doi.org/10.1016/j.caeai.2020.100001>
- Kabudi, T., Pappas, I., & Olsen, D. H. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature. *Computers and Education: Artificial Intelligence*, 2, Article e100017. <https://doi.org/10.1016/j.caeai.2021.100017>
- Kuleto, V., Ilić, M., Dumangiu, M., Ranković, M., Martins, O. M., Păun, D., & Mihoreanu, L. (2021). Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions. *Sustainability*, 13(18), Article e10424. <https://doi.org/10.3390/su131810424>
- Lampou, R. (2023). The integration of artificial intelligence in education: Opportunities and challenges. *Review of Artificial Intelligence in Education*, 4(00), e015–e015.
- Liu, Y., Chen, L., & Yao, Z. (2022). The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. *Frontiers in Psychology*, 13, Article e929175. <https://doi.org/10.3389/fpsyg.2022.929175>
- Lu, M. (2023). Challenges and opportunities in education with the integration of ChatGPT. *Geographical Research Bulletin*, 2, 247–249. https://doi.org/10.50908/grb.2.0_247
- Luan, H., Geczy, P., Lai, H., Gobert, J., Yang, S. J., Ogata, H., Baltes, J., Guerra, R., Li, P., & Tsai, C. C. (2020). Challenges and future directions of big data and artificial intelligence in education. *Frontiers in Psychology*, 11, Article e580820. <https://doi.org/10.3389/fpsyg.2020.580820>
- Luckin, R., & Holmes, W. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education
- Mallik, S., & Gangopadhyay, A. (2023). Proactive and reactive engagement of artificial intelligence methods for education: A review. *Frontiers in Artificial Intelligence*, 6, Article e1151391. <https://doi.org/10.3389/frai.2023.1151391>
- Markauskaite, L., Marrone, R., Poquet, O., Knight, S., Martinez-Maldonado, R., Howard, S., & Siemens, G. (2022). Rethinking the entwinement between artificial intelligence and human

- learning: What capabilities do learners need for a world with AI? *Computers and Education: Artificial Intelligence*, 3, Article e100056. <https://doi.org/10.1016/j.caeai.2022.100056>
- Mhlanga, D. (2021). Artificial intelligence in the industry 4.0, and its impact on poverty, innovation, infrastructure development, and the sustainable development goals: Lessons from emerging economies? *Sustainability*, 13(11), Article e5788. <https://doi.org/10.3390/su13115788>
- Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). *AI and education: A guidance for policymakers*. UNESCO Publishing.
- Mireles, M., & Sweeney, A. (2020). AI in education: Opportunities and challenges for equity. *Journal of Learning Analytics*, 7(3), 1-15. <https://doi.org/10.18608/jla.2020.73.1>
- Mohammad, S. S., & Saheal, H. (2023). A sneak peek into the future of artificial intelligence in education: Opportunities and challenges. In C. Krishnan, M. Babbar & G. Singh (Eds.), *Digital Transformation in Education: Emerging Markets and Opportunities*. Bentham Books.
- Moore, S. L., & Tillberg-Webb, H. K. (2023). *Ethics and educational technology: Reflection, interrogation, and design as a framework for practice*. Routledge.
- Nassar, A., & Kamal, M. (2021). Ethical dilemmas in AI-powered decision-making: A deep dive into big data-driven ethical considerations. *International Journal of Responsible Artificial Intelligence*, 11(8), 1–11
- Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., & Hosseini, S. (2023). Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks. *Education and Information Technologies*, 28(2), 2291–2360. <https://doi.org/10.1007/s10639-022-11214-1>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Bmj*, 372, Article e97. <https://doi.org/10.1136/bmj.n71>
- Parums, D. V. (2021). Review articles, systematic reviews, meta-analysis, and the updated preferred reporting items for systematic reviews and meta-analyses (PRISMA) 2020 guidelines. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 27, Article e934475-1. <https://doi.org/10.12659/MSM.934475>
- Păvăloaia, V. D., & Necula, S. C. (2023). Artificial intelligence as a disruptive technology—a systematic literature review. *Electronics*, 12(5), Article e1102. <https://doi.org/10.3390/electronics12051102>
- Rochmat, C. S., Riza, R., & Murni, S. A. (2024). Artificial intelligence in education: Opportunities and challenges in improving learning efficiency in the society 5.0 era. *Progresiva: Jurnal Pemikiran dan Pendidikan Islam*, 13(01), 91–100. <https://doi.org/10.22219/progresiva.v13i01.30007>
- Şalvarlı, Ş. İ., & Griffiths, M. D. (2021). Internet gaming disorder and its associated personality traits: A systematic review using PRISMA guidelines. *International Journal of Mental Health and Addiction*, 19, 1420–1442. <https://doi.org/10.1007/s11469-019-00081-6>
- Selwyn, N. (2022). The future of AI and education: Some cautionary notes. *European Journal of Education*, 57(4), 620–631. <https://doi.org/10.1111/ejed.12532>
- Shah, P. (2023). *AI and the Future of Education: Teaching in the Age of Artificial Intelligence*. John Wiley & Sons.
- Shankar, P. R. (2022). Artificial intelligence in health professions education. *Archives of Medicine and Health Sciences*, 10(2), 256–261. <https://doi.org/10.4103/amhs.amhs.234.22>
- Sharma, U., Tomar, P., Bhardwaj, H., & Sakalle, A. (2021). Artificial intelligence and its implications in education. In S. Verma & P. Tomar (Eds.), *Impact of AI technologies on teaching, learning, and research in higher education* (pp. 222–235). IGI Global.

- Sigfrids, A., Nieminen, M., Leikas, J., & Pikkuaho, P. (2022). How should public administrations foster the ethical development and use of artificial intelligence? A review of proposals for developing governance of AI. *Frontiers in Human Dynamics*, 4, Article e858108. <https://doi.org/10.3389/fhumd.2022.858108>
- Tao, B., Díaz, V., & Guerra, Y. (2019). Artificial intelligence and education, challenges and disadvantages for the teacher. *Arctic Journal*, 72(12), 30–50.
- Tedre, M., Toivonen, T., Kahila, J., Vartiainen, H., Valtonen, T., Jormanainen, I., & Pears, A. (2021). Teaching machine learning in K–12 classroom: Pedagogical and technological trajectories for artificial intelligence education. *IEEE Access*, 9, 110558–110572. <https://doi.org/10.1109/ACCESS.2021.3097962>
- Trivedi, C. M. (2023). The Integration of artificial intelligence in education: Opportunities and Challenges. *International Journal of Research in all Subjects in Multi Languages*, 11(10), 1–3.
- Williamson, B. (2017). *Big data in education: The digital future of learning, policy and practice*. Sage.
- Zadorina, O., Hurskaya, V., Sobolyeva, S., Grekova, L., & Vasylyuk-Zaitseva, S. (2024). The Role of Artificial Intelligence in Creation of Future Education: Possibilities and Challenges. *Futurity Education*, 4(2), 163–185. <https://doi.org/10.57125/FED.2024.06.25.09>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence in higher education: Where are we now and where do we need to go? *International Journal of Educational Technology in Higher Education*, 16(1), 1-20. <https://doi.org/10.1186/s41239-019-0176-8>
- Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. *Computers and Education: Artificial Intelligence*, 2, Article e100025. <https://doi.org/10.1016/j.caeai.2021.100025>

7 APPENDIX-A

7.1 Detail of articles included in the Study

Authors (s)	Journal	Title	Page	Date of Publication
Ana María ALONSO-RODRÍGUEZ	Teoría de la Educación. Revista Interuniversitaria,	TOWARDS AN ETHICAL FRAMEWORK FOR ARTIFICIAL INTELLIGENCE IN EDUCATION	79-98	June, 2024
Anda Āboliņa Silvija Mežinska Velta Ļubkina	<i>SOCIETY. INTEGRATION. EDUCATION. Proceedings of the International Scientific Conference.</i>	THE APPLICATION OF ARTIFICIAL INTELLIGENCE TOOLS IN HIGHER EDUCATION: OPPORTUNITIES AND CHALLENGES	57-71	May, 2024
Cecep Sobar Rochmat, Riza Riza, Safitri Anggia Murni	Progresiva: Jurnal Pemikiran dan Pendidikan Islam,	AIED (Artificial Intelligence in Education): Opportunities and Challenges in Improving Learning Efficiency in the Era of Society 5.0	91-106	April, 2024
Olha Zadorina Volha Hurskaya Svitlana Sobolyeva Liliia Grekova	Futurity Education,	The Role of Artificial Intelligence in Creation of Future Education: Possibilities and Challenges	163-185	April, 2024

Svitlana Vasylyuk-Zaitseva				
Sheikh Sajid Mohammad & Huzina Saheal	Digital Transformation in Education,	A Sneak Peek into the Future of Artificial Intelligence in Education: Opportunities and Challenges.	207-222	2023
DR. CHHAYA M. TRIVEDI	International Journal of Research in all Subjects in Multi Languages	The integration of artificial intelligence in education: opportunities and challenges.		2023
Rania Lampou	Review of Artificial Intelligence in Education	The integration of artificial intelligence in education: opportunities and challenges.	1-12	2023
Mei Lyu (Lu)	Geographical Research Bulletin	Challenges and opportunities in education with the integration of ChatGPT	247-249	Dec, 2023
Valentin Kuleto , Milena Ilić , , Mihail Dumangiu , Marko Ranković , Oliva M. D. Martins , Dan Păun and Larisa Mihoreanu	Sustainability,	Exploring Opportunities and Challenges of Artificial Intelligence and Machine Learning in Higher Education Institutions	13(18)	2021
Gwo-Jen Hwang Haoran Xie Benjamin W.Wah Dragan Gašević	Computers and Education: Artificial Intelligence,	Vision, challenges, roles and research issues of Artificial Intelligence in Education		2020
Hui Luan , Peter Geczy , Hollis Lai , Janice Gobert, Stephen J. H. Yang , Hiroaki Ogata , Jacky Baltes , Rodrigo Guerra , Ping Li and Chin-Chung Tsai,	Frontiers in psychology,	Challenges and future directions of big data and artificial intelligence in education.		Oct, 2020
Hernando Barrios Tao Vianney Rocío Diaz Yolanda M Guerra	Arctic Journal,	Artificial intelligence and education, challenges and disadvantages for the teacher.	30-50	2019

8 APPENDIXE-B

8.1 Data Extraction and Analysis

Study	Methodology	Objectives	Participants	Key Findings
Ana María ALONSO (2024)	Qualitative	The primary objective to explore the opportunities, associated risks, and ethical impact of Artificial Intelligence	As it was based on library research so there was no specific participants of the study were	The study places the identified ethical problems within the broader ethical tradition, questioning the proliferation of sub

		on education.	included.	domains within the discipline
Āboliņa et al. (2024)	Mixed Methods Research	To provide an overview of the AI tools being used in the field of Education.	44 students, 4 lecturers, 1 representative form the company of AI and ML	To much reliance on Artificial intelligence, lack of critical thinking and communication skills, ethical issues and Information inaccuracy
Rochmat et al. (2024)	Qualitative	The primary objective of the study was to explore the opportunities and challenges of artificial intelligence in education.	As it was based on library research so there was no specific participants of the study were included.	Challenges: need free access of internet, dependency on technology, reduced critical thinking among students.
Zadorina et al. (2024)	Mixed Methods Research	What challenges are faced when AI tools are applied in Ukrainian institutions of higher education? What measures are taken to overcome them?	Teachers, students and AI developers	The major findings related to challenges of artificial intelligence were, access and equity, quality of education content, teacher training and support, formation of specific skills (digital literacy, data privacy and security are the major challenges.
Mohammad, S. S., & Saheal, H. (2023)	Qualitative	To explore the impact of artificial intelligence in education	Literature, AI application, teachers and students effected from technology	The findings related to challenges were need for inclusive policy, teacher training for the use of artificial intelligence and ensuring ethics and transparency in data use.
DR. CHHAYA M. TRIVEDI (2023)	Qualitative	The study aimed to explore the prospects and obstacles associated with incorporating AI within educational frameworks.	As it was based on existing review of the literature there were no specific participants of the study.	The key findings of the study were about challenges of artificial intelligence were ethical concerns, lack of technological accessibility, lack of training and over-reliance on technology for using of artificial intelligence.
Lampou, R. (2023)	Qualitative	To explore the current and potential role of artificial intelligence in the educational sector, addressing its benefits and potential challenges	As it was based on existing review of the literature there were no specific participants of the study.	The major challenges were the harm of artificial intelligence and its use for destructive purposes

Lu, M. (2023)	Qualitative	To explores the challenges and opportunities that ChatGPT brings to education		Balancing personalized learning, Information accuracy and reliability, Privacy and data security, Balancing technological dependency and human care, Widening the digital divide, Ethical issues and responsibility
Valentin Kuleto et al. (2021)	Mixed Methods Research	The primary objective of the study was to explore the opportunities and challenges of incorporating artificial intelligence and machine learning in higher education institutions	Students were included as population	There were some challenges regarding investment in infrastructure, resistance to change and continuous training and development.
Luan et al. (2020)	Qualitative	The primary objective of the study was to present the current status, opportunities, and challenges of integrating big data and AI in education	Researchers, teachers, students, policy makers and industrialists	Balance human and machine learning, transformation from one-size-fits-all to precision education, addressing algorithmic bias, and ensuring ethical use of data. Adapting to the paradigm shift in education, preparing teachers for new technologies, and ensuring data privacy and protection.
Tao et al. (2019)	Mixed Methods Research	The main objectives were to identify and analyze teachers' perceptions of the application of robotics and artificial intelligence (AI) in education and to explore the challenges and disadvantages associated with the integration of these technologies in educational settings	Teachers were the population.	The major findings about challenges of artificial intelligence were it creates lack of leadership behavior, decrease in response rate, AI would not stimulate critical thinking and the emotional impact cannot be measure in learning by AI.