Exploring the Benefits and Challenges of Artificial Intelligence in Education

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Keywords

Artificial Intelligence (AI), education, Christian values.

Abstract

In recent decades, countries are using artificial intelligence (AI) at a high level and in almost all sectors including education. However, the integration of AI into educational systems raises ethical, and practical concerns. This paper answers the following research question: How can AI be ethically integrated into education in a manner that promotes human dignity, protect students' well-being, and addresses the potential risks and challenges associated with its use? The method of desk review was applied to the research to collect the secondary data and to analyse it. The theological principles including the value of human dignity, stewardship, and community context critique the over-reliance on AI that could undermine the relational and holistic aspects of learning. The paper advocates for a balanced, ethically grounded framework for the use of AI in education that safeguards human relationships and supports the holistic development of learners. As recommendation, AI should serve as a tool for greater educational transformation in alignment with God's purpose for human equity.

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1. Introduction

These days, the artificial intelligence (AI) has grown to be something that's a part of our daily lives, in ways we don't even realize it. Globally, AI simplifies tasks and addresses problems we face. For instance, the self-driving cars in the developing countries, the smart home device, medical diagnosis, and the development of technology. This rapid advancement of AI has ushered in a new era for education, offering transformative opportunities that can enhance learning process, improve administrative efficiency and foster inclusivity (Luckin, R., et al., 2016). Today, AI is an important tool in education benefiting both learners and teachers. Its tools save time, function as a tutor, and enhances the learning method. According to Holmes et al (2019), AI driven tools such as adaptive learning platforms, automated grading systems, and assistive technologies for learners with disabilities promise to revolutionize how students engage with educational content and interact with teachers. This paper covers also what possible disadvantages and risks there are of AI in education, including ethical considerations, spiritual, and practical concerns that require a careful theological examination. Yet, AI holds the potential to elevate educational practices, but it also presents challenges that could undermine key aspects of human interaction, critical thinking, and the holistic development of students (Williamson, B., & Eynon, R., 2020). These concerns highlight the need for an integrated approach that combines the benefits of AI with a strong ethical framework, ensuring that technological advancements do not compromise the values of human dignity, community, and equity.

Studies showed that while the integration of AI into education offers significant benefits, it also risks weakening the relational and moral dimensions of learning and teaching. Moreover, the absence of clear ethical guidelines in its implementation can lead to inequalities, data privacy violations, and an over-reliance on AI systems, potentially detracting from the human-centered approach essential to education (Bennett & Maton, 2020). This research seeks to address these gaps by critically examining the ethical challenges and benefits of AI with a focus on how AI can serve as a tool for human flourishing in educational contexts.

The research question guiding this paper is: *How can artificial intelligence be ethically integrated into education in a manner that addresses the potential risks and challenges associated with it use*? To answer this question, the paper aims to explore the benefits and pitfalls of artificial intelligence, focusing on it effective integration into educational practices. From this regard, the paper analyzed the potential benefits of AI in enhancing learning and teaching process and evaluate the ethical challenges associated with its use, including concerns about privacy, and erosion of human interaction. The paper provided a theological framework for the effective use of AI in education, grounded in ethical principles such as stewardship, human dignity, and equity.

2. Background to the Study

Artificial intelligence has progressively become an essential tool in education, with applications that range from intelligence tutoring systems to data-driven analytics for student performance (Zawacki-Richter et al., 2019). The use of these tools has modernized the educational methods in a way of offering improved learning experiences. However, the integration of artificial intelligence into education raises significant questions about its impact on the ethical dimensions of learning. For instance, while AI can support students with disabilities by providing assistive technologies, it also risks creating new forms of inequality if not implemented attentively (Holmes, W., et al. , 2019). In the same perspective, the study showed that artificial intelligence may mistakably perpetuate biases, leading to unfair outcomes in educational assessments (Williamson, B., & Eynon, R., 2020). This paper is beneficial for anybody interested in the use of artificial intelligence particularly in education, and in other domains in general. Teachers, students and researchers interested to learn more about the topic will find new ideas and find out new tools they could apply and benefit from in studies, or for any other purpose.

3. Literature Review

3.1 Definition of artificial intelligence (AI)

Artificial intelligence could be explained as intelligence that is reached in an artificial way, something that does not exist naturally, but is created a copy of something that already exists, in this case the human intelligence (Amanda, L.-N., 2023). In other words, Artificial Intelligence (AI) is defined as the branch of computer science dedicated to creating machines capable of performing tasks that would typically require human intelligence. In the Encyclopaedia Britannica artificial intelligence is described as the capability of a computer or a computer-controlled robot to do things that normally require human intelligence and judgement, things that previously could have been done only by humans. Since it learns from previous mistakes, AI can reduce human error. It can also make decisions that are unbiased, whereas a human might be influenced by something in their decision (Copeland, B.J., 2023).

3.2 History of artificial intelligence

The rise of artificial intelligence dates to 1950 when Alan Turing, a computer pioneer invented the related technology. Some months before, he had talked about the concept of an intelligent machine. In 1950, Turing did a test known as the Turing Test which aimed to see whether a computer can think like a human. This test includes a computer, human interrogator, and a human respondent. The interrogator asks any type of questions to the computer and the respondent, and based on the answers must then guess which is the computer. The human respondent must try to help the interrogator make a right guess, but the computer is allowed to answer in any way it is capable to not be identified (Copeland, 2023).

Five years later, three researchers Allen Newell, Cliff Shaw, and Herbert A. Simon, designed a computer program called “Logic theorist” with the purpose to mimic human problem-solving skills. Though many people consider this the first program done with artificial intelligence, “it is not until 1956 when the word “artificial intelligence” was coined by John McCarthy

during the DR-PAI conference at Dartmouth college campus, where a bunch of top researchers participated" (Amanda, L.-N., 2023). Since that year, artificial intelligence developed. For instance, a chatbot called Eliza was invented by Joseph Weizenbaum. It was able to hold a conversation with humans. During 1970s Expert Systems appeared, this term is not being used anymore, but the expert systems still exist, for instance a grammar check which is based on rules. The main objective of Expert systems was to make decisions in a way of a human expert, through either a rule based, frame based, or logic-based process. In the 1990s to 2000s AI really flourished and hit its goals. A remarkable event happened in 1997 when the chess champion Gary Kasparov lost a chess game to a computer program, called IBM Deep Blue (Anyoha, R., 2017) ; (Mueller, J. & Massaron, L., 2018). Artificial intelligence evolved so much during the 2010s. Various tools have been invented. For instance, personal assistant SIRI that was released by Apple for their devices, and TESLA that created their autopilot based on AI. Amanda (2023) tested that nowadays, we have hundreds of new tools based on artificial intelligence released daily, developed to perform different tasks. The most recent huge developments of AI are the chat-bots ChatGPT by OpenAI, translator program DeepL, and Bard by Google (Amanda, L.-N., 2023).

3.3 Classification of artificial intelligence

The first type of artificial intelligence is "Narrow AI" also called "Weak AI". It refers to systems that are specialized to handle specific tasks. Some examples include Siri, autopilot, chatbots, and Netflix recommendations (Schroer, A., 2022). For instance, the AI-based language translation tools like Google translate, which can only perform the specific task they were trained for. The second type is "General AI (Strong AI)" which is an AI system that is capable of performing any intellectual task that a human can. The third type of artificial intelligence is "Super intelligent AI" which would surpass human intelligence in all respects.

Artificial intelligence can also be put into four different categories depending on its capabilities: re-active machines, limited memory, theory of mind, and self-aware AI. Reactive machines are the most basic type of AI, they have no

memory and perform only the specific tasks they are programmed for. In this category, we have "The IBM Deep Blue chess program" and "Netflix recommendations". Limited memory which is the second category was developed based on reactive AI. It can learn from the data it receives and become smarter the more historical data there is. It is programmed to mimic how the neurons in human brains work. For instance, self-driving cars observe things around them such as how other cars move, their speed, etc (Amanda, L.-N., 2023). Theory of mind, in contrast to the Limited memory, builds a system that is capable to understand opinions and emotions, and act based on those emotions when interacting with a human. It is able to imitate human relationships, and see how different things affect one another. The fourth category of artificial intelligence called "self-awareness" is the most advanced type of AI. It is called so to express that the AI would be aware of itself. All categories express their feelings and needs, and predict other's feelings or needs. Researchers said that this type of AI will never be achieved (Amanda, L.-N., 2023).

3.4 Artificial intelligence fields

The artificial intelligence has six main fields which are: machine learning, deep learning, neural networks, natural language processing, computer vision, and cognitive computing. In machine learning, the computer learns by receiving data and learning from automatically to get better a certain task. Specifically, machine learning is used in for instance image and voice recognition. Deep learning uses neural networks; these are like neurons we have in our brains. Neural network analyses data repeatedly to find connections and give meaning to data that is undefined. Natural language processing is a crucial component in AI that in any way interacts with humans. It's what allows the computer to identify, analyse and understand spoken and written human language. It is certain that most people use natural language processing in some form daily. Some examples include spelling check, translators, or chatbots (Amanda, L.-N., 2023). Computer vision is the ability to recognize and understand data in a visual form, such as an image or a video. Self-driving cars use computer vision detect and recognize objects around them. Also, facial recognition is an example of computer vision.

Lastly, cognitive computing technology is designed to mimic the human brain, so a computer can help people perform challenging tasks in a way a human would, it can solve situations where the answer is uncertain. It can be applied in sentiment analysis, where also an actual human brain can in some cases be uncertain of the correct answer (Amanda, L.-N., 2023).

3.5 Applications of AI in different fields

Artificial intelligence is a crosscutting tool. Before focusing on education, let's see its application in other domains globally. In health care, AI-powered diagnostic tools like IBM's Watson Health analyse medical data to recommend treatment plans or assist in diagnosing diseases such as cancer. Medical imaging uses Ai systems as Aidoc to read and interpret medical images, detecting issues such as brain haemorrhages with high accuracy (Hernandez, J. M., et al., 2018). Artificial intelligence is applied in finance sector for tasks like fraud detection. For example, MasterCard uses AI to spot fraudulent transactions in real time (Chui, M., Manyika, J., & Miremadi, M., 2018). Artificial intelligence is also used in transportation. For instance, Tesla's Autopilot system, uses AI for features like automatic lane changing and traffic-aware cruise control (Goodall, N. J., 2014).

3.6 Applications of AI in education

Nowadays, there are mixed reactions to using AI in education. Some are worried about the possible risks, while others are excited about the opportunities it brings. The subsequent paragraphs analyse the application of Ai in education. According to (Luckin, R., et al., 2016), artificial intelligence is transforming education by enabling personalized learning. It is being used for administrative tasks, such as grading, creating assignments, among others. This reduces the burden on educators and allows them to focus on teaching. Universities can encourage using AI in teaching and in studying. In teaching, course coordinators can decide how AI can be used in a course.

> "The teachers also must instruct the students on how to use AI for assignments, for instance a whole text generated by AI cannot be presented as somebody's own, as

> that would result in plagiarism. These instructions focus mostly on language models such as ChatGPT, Bard, DeepL, and similar. It is also warned that these language models are not typically able to produce a high-quality text on a very specific topic (University of Helsinki, 2023).

Colleges and universities can inform students and teachers about AI and prepare them for its future allowing them to use it to their advantage. However, there are schools which are in fear of fraud and plagiarism, so they have banned ChatGPT (Amanda, L.-N., 2023).

3.7 List of AI tools for students in their learning process

There are plenty of tools students can benefit from in their learning process but might not even know about. For instance, ChatGPT is a natural language processing tool developed by OpenAI, officially released in November 2022. The tool works like a chatbot and generates text based on user input. It has been designed to give intelligent responses to anything the user writes or asks. Grammarly enhances writing quality by checking grammar, punctuation, and style. Zotero is used in research and note-taking. It helps organize and cite research materials for academic papers (Anderson, J., 2023), Quillbot assists with paraphrasing and summarizing texts effectively to enhance writing in multiple ways. The tool offers to reword your written text in any way you like. It can improve the language and grammar, rewrite the text to be more formal or simple, it can also make the text creative, and make it either longer or shorter. QuillBot improves the vocabulary, tone, fluency, and style used. It can also adapt to different English dialects. It allows the user to find synonyms for any word, while also offering plagiarism check, translator, and citation functions (QuillBot, 2023). Elicit is AI assistant for summarizing and retrieving academic papers (Davis, L., 2023), A tool that especially students studying programming can benefit from is GitHub Copilot. Symbolab provides solutions for advanced math problems with explanations. Duolingo uses gamification and AI to teach new languages (Miller, A., 2022). The list is not exhaustive.

However, there are the AI tools and practices often discouraged for students based on academic policies and ethical considerations. As argued by (Dehouche, N., 2021) tools like math solvers and essay generators that produce direct answers or assignments undermine academic integrity. Those platforms are ethically forbidden because they create fully written essays without student engagement. AI tools used to bypass plagiarism detection are problematic, tools that fabricates references or citations contribute to academic fraud (Smith, A., & Jones, R., 2023). In the same line, AI tools used without consent, or that violate privacy or ethical norms are not allowed likely the AI chatbots for crafting emails, discussion posts are prohibited as they undermine the authenticity of communication (Doe, J., 2022).

Artificial intelligence is also used by teachers. To enhance teaching effectiveness, improve classroom management, and deliver personalized education. Teachers may use different AI tools likely Edmodo that facilitates planning, communication, and resource sharing with students (Johnson, T., 2023), Moodle with AI plugins which allows personalized content delivery and student analytics (Anderson, J., 2023), Google classroom with AI Add-ons which supports assignment tracking and feedback (Hernandez, J. M., et al., 2018). Turnitin detects plagiarism and provides feedback on writing quality, and Gradescope which automates grading for written assignments, reducing workload (Garcia, M., 2023), Watson education (IBM) assists in planning lessons and providing tailored feedback (Miller, A., 2022).

3.8 Advantages and disadvantages of artificial intelligence in education

The use of artificial intelligence in education can have some advantages by changing the way students learn and teachers teach. Amanda, said that

> "There are many potential advantages of using artificial intelligence (AI) in education, including personalized learning. AI system might be able to analyze a student's performance on assignments and tests to identify areas where they are struggling and provide targeted feedback and support.

> The next point, improved efficiency, is all about supporting teachers and students. AI systems can help teachers and administrators be more efficient by automating routine tasks such as grading, scheduling, and data analysis. This can free up teachers' time to focus on more important tasks, such as lesson planning and working with students. Accessibility is a very important feature for students with disabilities or special needs, also for students who are just in need of a different learning method. There are for instance text-to-speech and speech-to-text AI systems that improve the accessibility of education (Amanda, 2023, p. 11-12).

Besides these advantages, there are a couple more other positive impacts of artificial intelligence in education. For instance, students who are shy to ask question may use AI to formulate an idea or a question. There are even AI tutoring systems that can help students in their learning by giving feedback. AI help students to paraphrase, to summarize, and to correct their sentences. Teachers and students use AI to formulate the structure of their works.

While there are many potential benefits of using artificial intelligence in education, there are also some potential disadvantages to consider. Firstly, addiction and relying too much on AI technology is a risk that is very likely to happen. When students/teachers use instantly AI to solve any kind of problems limit their ability to think by themselves, and therefore, their problem-solving skill could be affected. Secondly, AI limits the performance of students who consistently use AI in their learning process.

> "Critical thinking and collaboration can also be affected, as the computer can give information for them, then there is no need to collaborate with anyone else. A student can become addicted to artificial intelligence technology and whenever there is an obstacle, they will immediately turn to an AI tool instead of thinking about it (Amanda, L.-N., 2023).

Thirdly, AI can limit collaboration between learners. There are students who learn well when they follow explanation from their peers. Promoting AI in

education can affect negatively a good number of students. The lack of human interaction could also lead to worse communication skills, which are critical in life. The studies showed that speechless affect communities/classes which rely on AI because, all the answers are generated by AI with no need of discussion. The cost-effectiveness of AI is also a debatable topic. While schools struggle to find budget for AI, students face a big challenge about buying laptop and other AI tools. The last point brought up is privacy and security concerns.

To sum up this section, artificial intelligence is an important tool, a transformative force with vast potential to enhance various aspects of life such as in healthcare, finance, and education. It offers numerous advantages including efficiency, automation of tasks, and the personalized experiences. However, challenges such as job displacements, privacy risks, ethical concerns must be addressed. Policymakers, government, NGOs should work together for a careful management and regulation of AI ensuring that its benefits are maximized while minimizing its negative impacts.

4. Research Methodology

The research design used for this study is a desk review, which involves systematically reviewing and analyzing existing literature on the use of AI in education perspective. This design was applied through the collection of peer-reviewed journal articles, books, reports, and case studies on AI in education, focusing on practical dimensions. The review process involves evaluating the benefits and challenges of AI in education, specifically exploring frameworks such as Imago Dei, stewardship, justice, and virtue ethics. To choose the literature, the researcher focused five criteria. The first one is relevance; all articles and books were directly related to AI in education or the ethical implications of technology use. The second criterion was the date of publication. Given that the artificial intelligence is a recent achievement in technology, only sources published within the last 10-15 years were considered, with a focus on the most studies from 2020 onwards. This required the researcher to go to the next criterion "academic rigor". The selected sources were peer-reviewed or published by recognized

academic institutions, scholars, or authoritative organizations. All sources were in the line of ethics addressing AI in education. The analysis maintained objectivity and transparency in summarizing findings from multiple perspectives.

5. Findings Interpretation in the Rwandan Context

This paper explored the Artificial Intelligence (AI) in education and revealed both transformative opportunities and pressing challenges. Scholars highlighted the Rwandan government effort in prioritizing digital transformation through its *Smart Rwandan Master Plan* and *Vision 2050*. The studies showed that AI offers an essential and powerful tool to reshape educational delivery. However, the application of AI technologies must follow the Rwanda's socio-economic landscape for a better improvement. The paragraphs below discuss the findings of this research. First of all, AI-driven personalized learning tools help bridge performance gaps in rural and low-performing schools, where teacher shortages are prevalent. The problem is that the benefit of such systems remains largely theoretical at present due to the low distribution of the internet connectivity. This creates a visible equity gap where urban students gain more and more from AI-enhanced education than their fellows from rural counterparts.

Secondly, the Intelligent Tutoring System (ITS) which was supposed to be transformative in supporting the government's competency-based curriculum by providing individual feedback and remediation is too expensive. Both teachers and students with insufficient infrastructure in public schools don't access it easily. The researcher advocates for remote areas which don't have sufficient investments in localized AI solutions that support Kinyarwanda and align with the national curriculum.

On the third position, we have the automation and teacher workload. The research showed that Rwandan teachers, especially in public schools, are overloaded. For this reason, AI tools for attendance, grading and lesson planning could significantly reduce this burden. The study showed that this burden will continue as long as the ICT training level for teachers is not yet enough. To address that problem, the Rwanda Education Board (REB) and

Teacher Training Colleges (TTCs) need to integrate AI literacy into their programs to prepare educators for a blended future of teaching.

Fourthly, the AI stands in a good position to enhance the education for all by promoting the inclusivity of the students with disabilities. The Government of Rwanda will continue to benefit from AI tools that support translation and adaptive communication from Kinyarwanda to two main foreign languages which are English and Kinyarwanda. The study showed that current AI technologies lack support for Kinyarwanda, limiting their effectiveness in early primary education

The following finding is the data privacy and ethical concerns. The Government of Rwanda should develop clear national AI policies or robust data protection laws in the education sector. It also has to set up ethical guidelines for the use of AI in education in order to promote creativity from teachers and students. For better improvement, it should be good to improve collaboration between government, civil society, and tech developers to ensure students data handled responsibly and transparently.

Two last findings are also sensitive. The first one is the teacher preparedness and cultural resistance. In fact, while the Rwandan government has invested in initiatives like *Smart Classrooms* and *One Laptop per Child*, the study showed that many teachers remain skeptical and/or underprepared to integrate AI in their daily teaching. This situation is amplified by cultural attitudes towards technology, and fear of job displacement. To address that problem, the Government of Rwanda needs undertake continuous professional development and awareness campaigns to reframe AI as a complement, not a competitor to human teachers. The last finding is about the affordability and sustainability of AI solutions. The study showed that AI infrastructures for instance devices, software licenses, maintenance, and internet are too expensive. Rural schools are not able to afford their prices. To overcome this, the government will play its role in encouraging partnerships with local tech startups, international donors, and research institutions to develop low-cost AI tools tailored to local needs.

In some schools, the students rely on AI and limit their ability to be innovative. To help them, teachers should ask them to submit assignments in

stages to track progress, to type assignments in class with no Wi-Fi and to write assignments by hands. On their side, teachers should use google docs with version history available to detect the use of AI. They should give presentations along with presentation assignments and complete oral assessments along with written assignments.

6. Comparison with Previous Studies

Considering the benefits of artificial intelligence in various domains, especially in education, this study reaffirms AI's role promoting education hence it facilitates learning and teaching process. Yet, the identified pitfalls emphasize the risks of unethical AI adoption, it is important to integrate ethics into discussion on AI, ensuring justice, equity and human dignity in its implementation.

7. Strengths and Weaknesses

The strength of this paper is its interdisciplinary perspectives, merging ethics with educational technology. However, it is limited by its reliance on secondary data, which constrains the ability to assess real-world applications expansively. Future studies should incorporate case studies from different schools to validate these insights.

8. Unexpected Findings

One of the unexpected findings is the alignment between AI's capabilities and ethical values. Both disciplines highlight the responsible stewardship. This surprising alignment suggests that AI, when ethically deployed, can be a tool for realizing theological commitments by promoting human equity. The education for all is at the same time the initiative of the government and the ethical imperative to care for the vulnerable. These findings highlight the need for government's engagement with AI to shape an education system that reflects ethical values while addressing 21st-century challenges.

9. Recommendations

- Virtues such as wisdom, justice, and stewardship should guide ethical decisions in education and technology
- The artificial intelligence should serve as a tool for greater educational transformation in alignment with God's purpose for human equity
- The irreplaceable role of teachers and human interaction should be taken into consideration.
- Foster interdisciplinary dialogue between theologians, educators, and technologists.
- Encourage governments to develop guidelines for AI use in education.
- Decision makers should promote access to AI technologies for marginalized communities.

10. Conclusion

This study about the benefits and challenges of artificial intelligence in education explored the role of Artificial Intelligence in education. The study showed that AI plays an essential role in education because, when its innovations are effectively applied, have the power to improve learning outcomes, reduce teacher workload, and expand access to quality education.

Various countries applied AI technologies in education and achieved a vibrant economic level by providing education for all. The government of Rwanda has remarkable efforts like One laptop per Child and Smart Classrooms which helped the researcher to justify the statement which says that AI technologies are the essential tool to enhance the education for all. Though there are visible benefits of Artificial Intelligence in

Rwanda, this study showed that there are barriers that hinder the socioeconomic development level need by the country. Learners from rural areas don't have the required infrastructures, the teachers' preparedness, the ICT training and many other problems are the visible challenges of the use of AI in the Rwandan context. The study showed that the government of Rwanda faced them one by one and could strive for excellence. Great efforts have been made to integrate AI into the education system and achieve an inclusive participation of learners from both sides of the country. Infrastructures are distributed in rural and urban areas; teachers have been trained. As recommendations, this study showed that it should be good to continue the collaboration between government bodies, educators, tech developers, and civil society to ensure that AI becomes a tool for educational equity rather than exclusion. Policy makers, stakeholders and all partners should balance the use of AI because artificial intelligence is not a substitute for human teachers. It can only be a powerful ally in advancing Rwanda's educational transformation. The development of AI technologies in Rwanda's education should be rooted in the national priorities and cultural realities. Doing so, AI will contribute meaningfully to building a more inclusive, efficient, and future-ready education system.

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Short Biography

Rev. Jonas Musengimana is a dedicated pastor in the Presbyterian Church and a PhD student specializing in the history of Christianity. He serves as a lecturer of applied Christian ethics at the Protestant University of Rwanda. He holds a Master's degree in Ethics and Leadership from the Protestant University of Rwanda, a Master's degree in Public Health from Kampala University, and has completed a professional course in Improving Global Health Equity from Harvard University (online).

With a strong academic focus, Rev. Musengimana is researching John Calvin's leadership model and its historical contribution to church self-sufficiency, particularly in the context of the Presbyterian Church in Rwanda. His broader interests include Restorative justice, eco-theology, sustainable development, and the ethical implications of digitalization in education. Actively involved in community and academic discussions, he contributes to advancing theological reflections and practical applications in African societies

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