Integration of AI in Education and Didactic Childhood Advancement and Progress

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Abstract

The state of education in our country has been a contentious topic for many years. Numerous reforms have been done but there are still some problems – inefficient learning resources, is but one of the many. Due to inexperience on this topic this problem continues to plague the education system. However, taking an informed and educated approach with the interests of the students prioritized, we believe that many of these problems could be solved with the use of Artificial Intelligence (AI). Its proper integration into the education system could aid in the improvement of efficiency of learning resources, through the use of various tools like chatbots, adaptive learning systems and intelligent assessment systems. By implementing the use of AI in a world where learning resources are scarce, there can be standardized learning throughout the country regardless of availability of learning materials. The main agenda of this study is to explore ways of implementing the use of Artificial Intelligence into educational systems to integrate the use of learning materials, hence bringing about improved quality of education. We are fully aware of the problems facing the implementations of this study but we are ready to conduct rigorous research to combat them.

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Introduction

Education has been and will continue to be quite frankly one of the most important aspects of today's society. It remains a cornerstone of progress and empowerment. It is the light that illuminates the path to one's fulfillment and collective advancement. With knowledge comes the power to transform lives, break barriers, and shape the destinies of those around us let alone ourselves. Investing in education is investing in the promise of tomorrow, ensuring that everyone has the opportunity to reach their full potential and provide meaningful contribution to society. The role of technology in education is a gem tucked away in a rock that we need to mine out and discover. Technology has the role to transform and enhance various aspects of the learning process. Artificial intelligence specifically allows machines to execute tasks that have traditionally required human cognition. AI-powered programs and devices can make decisions, solve problems, understand and mimic natural language, and learn from unstructured data (University of Colorado, 2024). Artificial Intelligence (AI) as we know it has the power to totally redefine the space of education today. It has the ability to innovate teaching and learning practices and accelerate progress to the goal of all inclusive education, education for all. We are committed to enable society to harness the potential of AI technology in education, and our hope is that you share this vision with us too, for it shows not only great promise but it creates hope for a better tomorrow. A tomorrow where those who have never gotten the chance to experience the gift of education finally have access to it. Education is for improving the lives of others, and for leaving our communities and world a better place than we found it.

Integrating education in Kenya encompasses a multifaceted approach aimed at enhancing the quality, accessibility, and relevance of the educational system across various levels and sectors. At its core, integration involves harmonizing different components of the education system, including curriculum, teaching methodologies, assessment practices, technology, infrastructure, and policy frameworks, to create a cohesive and comprehensive learning environment. This approach seeks to break down silos between different levels of education (such as primary, secondary, and tertiary) and between formal and informal education channels, ensuring a seamless progression for learners and a holistic approach to their development.

In the Kenyan context, education integration often involves aligning educational goals and objectives with the country's broader socio-economic development agenda. It emphasizes the need to equip learners with relevant knowledge, skills, and competencies that are essential for their personal growth and success in a rapidly changing world. Integration also emphasizes inclusivity, ensuring that education is accessible to all individuals, regardless of their socio-economic background, geographic location, or physical abilities. This may involve measures to address disparities in educational resources, improve infrastructure in underserved areas, and promote gender equality and social inclusion.

Furthermore, integration in Kenyan education extends beyond the confines of traditional classroom settings to incorporate experiential learning opportunities, community engagement, and partnerships with various stakeholders, including government agencies, civil society organizations, and the private sector. This collaborative approach allows for the enrichment of learning experiences and the integration of real-world perspectives into the curriculum,

enhancing the relevance and applicability of education to students' lives and future careers. Ultimately, education integration in Kenya is a dynamic and ongoing process that requires continuous innovation, adaptation, and investment to ensure that the country's educational system remains responsive to the evolving needs and aspirations of its citizens and contributes to national development goals.

Artificial intelligence in education

As aforementioned, Artificial Intelligence (AI) allows machines to execute tasks that have been traditionally thought to be executed using human cognition. A very good example is teaching. The conventional method of teaching has always been a teacher to the students. Suffice it to say this has been a method that has stood the test of time and has remained the way to go for eons. Are we attempting to fix something that isn't broken? Quite the opposite! Integration of Artificial Intelligence (AI) as we believe, would revolutionize the learning experience and in the home run expand access to better quality of education. AI-powered tools can adapt to individual learning styles and paces, providing tailored support to students and addressing their specific needs. Now we are not advocating for the complete replacement of teaching by AI but rather dynamic integration allowing it to be used concurrently with teachers to achieve the overall goal of all inclusive enlightenment.

Case studies on the integration of ai in early education

In this section we will explore some real-life examples where AI has been used in various forms of education. We will take a look at the effect it has had and its impact on the status quo in the various areas of application. In fact, 99.4% of 509 higher institutions in the US say that artificial intelligence (AI) in education and learning will be instrumental to their institution's competitiveness in the next three years (AxonPark, 2023).

In a world where technology is advancing at an unprecedented pace, it's no surprise that AI is making its way into the classroom. As educators and researchers continue to explore the possibilities of AI in education, they are discovering its potential to revolutionize the way we learn.

-Case study on Singapore:

At Lakeside Primary School in Singapore, a trolley loaded with laptops is brought to the entrance of a fifth-grade classroom. Around 30 eager students rush into the hallway to collect their devices for a math lesson that incorporates artificial intelligence (Bangkok Post, 2023).

A teacher, equipped with a headset, encourages the students to establish their own objectives for the day's lesson, which they will engage with on their devices for several hours each week (Bangkok Post, 2023).

The students quickly log into an AI-driven "Adaptive Learning System" (ALS) available on an online learning platform created by the Education Ministry for fifth and sixth-grade

mathematics. Launched in June of the previous year, the ALS allows students to select their preferred level of difficulty from three options, while the AI generates questions tailored to their past performance and various other factors (Bangkok Post, 2023).

Singapore's education system is undergoing a significant transformation driven by the integration of AI and *Edtech* (StudyGleam, 2023).

Now this approach is not merely about adopting new technologies but fundamentally rethinking the approach to education. Aiming the scope to personalization, accessibility and efficiency.

The national AI strategy is aiming at making the nation a global hub for AI by 2030. This strategy is really big on adapting the learning experience to better suit the needs of the student, at a whole new level. By carefully analyzing individual learning styles, strengths and weaknesses, AI can deliver content not only relevant and engaging but also challenging. Here are some of the ways AI has been applied in real-time education in Singapore:

-Adaptive learning systems in Mathematics

These systems, powered by machine learning, assess the students' performance in real-time and adjust their learning pathways. Making it a more flexible learning experience educational experience in the classroom setting (NetworkingAI, 2023).

-Automated English Marking systems

As part of the AI strategy, automated systems are being used for the marking of English assignments. How so? These AI systems are able to identify language errors through the use of HNL (Human Natural Language). This relieves teachers of a lot of work and effort, therefore allowing them to focus on higher-order aspects to better help their students. This approach not only reduces teachers' workload but also enables them to dedicate more time to designing effective lessons and strengthening student-teacher relationships (NetworkingAI, 2023).

-AI-Enabled Learning Companions

Another innovative application of AI in Singapore's education sector is the development of AI-enabled learning companions. These systems support holistic learning by motivating students, encouraging reflection, and recommending further learning activities. They are designed to detect a student's engagement levels, providing tailored assistance for specific areas of difficulty, such as math problems, thus enhancing the learning experience (NetworkingAI, 2023).

AI in Singapore is just but an example of how this sector represents a broad landscape of opportunities. It gives the promise of a future where education is revolutionized, and made more accessible to all students. Even in Kenya. With careful guidance and advice from Singapore and other nations that have been able to implement AI in their education, Kenya can take its first influential steps towards the promising future AI offers the educational center.

-Case study in Stanford

A Stanford researcher developed an AI program to provide help to students whenever they got stuck (Axon Park, 2023). Now considering the fast-paced learning environment, suffice it to say that many students get lost along the way, maybe because of a concept they couldn't understand, or simply a lapse in concentration. The program was trained by analyzing performance data from 1,170 Ugandan school children who had used tablets to learn English reading skills through videos and mini-games. The program was able to predict whether a child would fall into "wheel-spinning", even before they had begun a new lesson (Nicol, J., 2018).

In four out of the six cases, the model and the human expert came up with the same recommendations (StanfordEdu, 2023). This study therefore concludes that AI can be used to identify student problems. In addition to that it makes it easier for a limited number of human teachers to help a larger number of students; a problem quite rooted in the Kenyan education system right now.

-Case study in the university of murcia in Spain

The University of Murcia in Spain recently implemented an AI-powered chatbot to assist students with inquiries about the campus and academic programs. To the surprise of administrators, the chatbot demonstrated a high level of proficiency, answering over 38,708 questions correctly more than 91% of the time. Keep in mind, this was before ChatGPT, and we can only expect these metrics to improve even further (AxonPark, 2023).

This implementation not only provided students with prompt responses outside of standard office hours but also resulted in an increase in student motivation. Additionally, the implementation of the chatbot did not require any changes to the existing staff structure (AxonPark, 2023).

A study by Knewton, an adaptive learning company, found that students using their AI-powered adaptive learning program improved their test scores by 62% compared to students who did not use the program. The program provided personalized feedback and instruction to students, tailoring the learning experience to their individual needs and abilities (Springsapps, 2024).

In conclusion the various studies highlighted above prove that AI does have the capacity to change the education sector for the better especially in Kenya. With careful consideration, timely research and support from the government we do see a brighter future where education is accessible to all. A world where a child doesn't miss out on his destiny because of some factors that are out of his/her control. Let's advocate for a better tomorrow today, to invest in a child's future. Quite frankly, they are the leaders of tomorrow.

Problems facing integration of artificial intelligence in education

Under this section, we shall discuss the problems facing the integration of A.I with education as discussed in the given abstract. We shall be tackling the main areas of trouble regarding the integration with A.I such as:

● Insufficient government funds

● Inaccessibility

● Malfunctions with the A.I systems

We shall also be providing solutions to these problems and show you how the integration of A.I systems will work in our hypothetical but also practical and realistic world.

-Insufficient government funds

Many governments or rather nations, especially those in the third world sector, face the problem of insufficient funds. This is due to the fact that these nations have so many responsibilities to handle and as a result they have to distribute their funds and allocate them accordingly. What we must realize is that the allocation of funds works in such a way that given amounts of money go to given sectors be it education, healthcare etc. We shall discuss and expound more of this in our solutions section.

Inaccessibility

The second challenge facing the implementation of A.I is its ability to reach people from far and wide.

There is no guarantee that everyone will get to enjoy the benefits of the powerful A.I as there is no guarantee that it will reach everyone.

Apart from the geographical aspect, let's look at the ability aspect. How much better will A.I make a physically handicapped student learn? We shall discuss this in our solutions section.

Malfunctions with the A.I systems

Just like any other systems, our A.I systems are bound to have their issues and errors. What is going to guarantee that these A.I systems put in place will actually work like they're supposed to and not malfunction completely rendering them useless? We shall show you in the solutions section.

In our attempt to show you how the implementation of A.I works, we have acknowledged that we may have some issues to do with the world we are bringing you, but we have also acknowledged that we have remedies to said problems which shall be presented in the solutions section.

Solutions regarding the integration of ai into education

Under this section, we discuss the solutions and remedies that shall be put in place in our world to alleviate the problems that may arise as stated in the previous section. We understand that we can't create a perfect world whereby all the problems are solved, but we can bring about a world whereby the problems are minimized. After all, a perfect world doesn't exist. Without further ado, let's look at the solutions.

-Variation in prioritization of fund

As discussed in our abstract and later on in the section regarding problems, we feel like the

solution to what might be the biggest problem facing our cause, is the insufficiency of funds allocated to A.I development for the purpose of education.

We understand that funds regarding the education sector are very limited and they are all divided and distributed accordingly with things to do with textbooks and salaries of staff etc. What we are trying to propose is that these governments would draw out some funds from these priorities and create one more altogether. At face value, this idea seems to have no weight at all. But with continuous injection of funds towards the development of artificial intelligence, we can guarantee its existence (1) and we can also guarantee its rapid development (2). When both of these ideas are put together we solve the problem of insufficient funds.

-Teacher training programs

Teacher training programs are but the most important thing in quite literally becoming a teacher. Teachers are taken through courses that arm them with skills required to do what they aim to do, teach. They are basically courses and qualifications that teachers undertake and receive at the outset of their careers, or one-off courses that are largely designed with a short-term or immediate purpose in mind.

Teacher training programs are essential for ensuring that educators have the necessary skills and knowledge to effectively integrate AI tools and technologies into their teaching practices. These programs should aim to empower teachers with the confidence and expertise to utilize AI in ways that enhance student learning experiences and outcomes. Training should cover not only the technical aspects of AI but also pedagogical strategies for integrating AI in various subject areas and grade

levels. In addition to this, teacher training programs could help clear out any misconceptions on the topic at hand and further equip teachers with ways of using AI to their advantage and most importantly the students' as well.

So what are some possible incorporation methods:

Professional Development Workshops

The aim of such worshops would be to move the target audience toward accepting and developing curiosity for the new possibilities brought about by AI (Stanford University, 2024).

This can be done by basically organizing workshops and seminars specifically focused on AI in education for teachers across Kenya. These workshops can be conducted by experts in the field of AI and education, who can provide hands-on training and practical guidance on integrating AI tools into teaching practices. There is also a possibility of such workshops to be integrated into teachers training courses.

Online Courses and Modules

Developing online courses and training modules on AI in education that teachers can access at their convenience holds great potential to be a game changer in implementing AI in education in Kenya. These courses can cover topics such as AI fundamentals, AI-enabled teaching strategies, and practical examples of AI integration in different subject areas. A good example

is the 'ai for education' course (Aiforeducation, 2023)

ii. Collaboration with Educational Institutions

Collaboration with universities and teacher training colleges in Kenya, as before mentioned, will help in integrating related content into their pre-service and in-service teacher education programs. This ensures that future and current teachers receive comprehensive training on AI as part of their professional development.

iii. Peer Learning Communities

Facilitating peer learning communities or networks where teachers can share experiences, resources, and best practices related to AI integration in education. This allows teachers to learn from each other and collectively explore innovative ways of incorporating AI into their teaching.

iv. Mentoring and Support

Providing ongoing mentoring and support to teachers as they experiment with integrating AI into their classrooms. This can involve pairing teachers with AI experts or experienced educators who can offer guidance, troubleshooting assistance, and encouragement throughout the implementation process.

v. Hands-On Projects and Experiments

Encourage teachers to engage in hands-on projects and experiments that involve using AI tools and technologies in real educational contexts. This practical experience not only enhances teachers' proficiency with AI but also enables them to develop innovative teaching approaches tailored to their students' needs.

vi. Recognition and Incentives

Recognize and incentivize teachers who demonstrate excellence in integrating AI into their teaching practices. This could include awards, grants, or professional development opportunities to further their expertise in AI and education.

-Remedy to accessibility

When we look at the problem of inaccessibility, we think that it inter-relates properly with the solution of variation of prioritization of funds. What do we mean by this? When we diverse our prioritization of funds and actually specialize its use, we can achieve two things that completely tackle the problem of inaccessibility:

● Geographical aspect

When funds are specifically allocated for transport and distribution of A.I facilities, more people from far and wide are more likely to have access to these facilities as measures are being put in place to have them get access to it.

● Ability aspect

When funds are specifically allocated to the section of handicapped students, we get a world where the development of A.I has been given special sections specifically meant to deal with

differently abled students. This therefore caters for that issue.

-Constant check ups

Now to deal with the problem of malfunctioned properties that may come with the A.I system, We shall employ a team of developers who shall conduct constant checkups on a timely basis to make sure that everything is okay and no faults cause the disturbance of learning for learners. We will also have a feedback system where we will receive complaints and suggestions on how to make the system better.

The table below outlines a short summary of some encountered problems in AI's implementation into education and possible solutions to them:

Table1: Summarizing problems encountered in the integration of AI in education

Welsh B. (2018). *Untitled image* [Image]. Retrieved October 29, 2024, from
https://miro.medium.com/v2/resize:fit:1400/format:webp/1*Rq9YSJWaItpRn1fm2zbiIA.png

Benefits of integration of artificial intelligence into education and didactic childhood advancement and progress

The integration of AI into education in Kenya holds significant promise for transforming teaching and learning processes, benefiting students, educators, and the education system at large. By leveraging AI technologies, such as personalized learning platforms, adaptive tutoring systems, and data analytics tools, educators can provide tailored learning experiences that cater to individual student needs, ultimately leading to improved academic outcomes. Moreover, AI-driven automation can streamline administrative tasks, allowing educators to focus more on meaningful interactions with students and fostering a culture of innovation and

creativity in the classroom. Access to quality education can be extended to remote and underserved areas through AI-enabled online resources, promoting inclusivity and equity. Additionally, by developing 21st-century skills and competencies in AI, students are better prepared to succeed in the global digital economy, contributing to Kenya's competitiveness and economic growth. However, it's imperative to approach AI integration in education with careful consideration of ethical implications, ensuring responsible and equitable implementation that prioritizes the needs of all learners.

Therefore, what are some of the benefits that are made in reach:

Personalized Learning

AI-powered systems can adapt to individual student needs, providing personalized learning experiences tailored to their pace, learning style, and interests. This individualized approach can help students better engage with the material and achieve their learning goals.

Improved Student Outcomes

By leveraging AI for adaptive learning, intelligent tutoring systems, and data analytics, educators can better identify students' strengths and weaknesses, provide targeted interventions, and track progress over time. This can lead to improved academic performance and higher student achievement levels (Centers for Disease Control and Prevention, 2014).

Enhanced Teaching Efficiency

AI tools can automate routine tasks such as grading assessments, generating personalized learning plans, and providing feedback to students. This frees up educators' time, allowing them to focus on more meaningful interactions with students, such as facilitating discussions, providing mentorship, and offering individualized support.

Access to Quality Education

In remote or underserved areas where access to quality education may be limited, AI technologies can bridge the gap by providing online learning resources, virtual classrooms, and interactive educational content. This enables students to access high-quality education regardless of their geographical location or socioeconomic background.

Teacher Support and Professional Development

AI can support educators by providing access to resources, lesson plans, and teaching materials aligned with curriculum standards. Additionally, AI-powered analytics can help identify areas for teacher professional development, allowing educators to continuously improve their instructional practices.

Promotion of 21st-Century Skills

Integrating AI into education can equip students with essential 21st-century skills such as critical

thinking, problem-solving, collaboration, and digital literacy. By engaging with AI technologies, students learn how to navigate and harness the potential of emerging technologies, preparing them for future employment opportunities in an increasingly digital

world.

Efficient Resource Allocation

AI-driven data analytics can help education policymakers and administrators make informed decisions about resource allocation, curriculum development, and educational policy reforms. By analyzing large datasets, AI can identify trends, predict future needs, and optimize resource distribution to maximize educational outcomes.

Innovation and Creativity

AI can stimulate innovation and creativity in the classroom by enabling students to explore complex problems, experiment with new ideas, and develop innovative solutions. AI-powered tools such as virtual reality simulations, chatbots, and collaborative learning platforms can spark creativity and foster a culture of innovation among students.

Inclusive Education

AI technologies can support inclusive education by providing accommodations and support for students with diverse learning needs, including those with disabilities or special educational requirements. AI-powered assistive technologies can adapt learning materials, provide real-time feedback, and offer personalized support to ensure that all students can participate fully in the educational process.

Global Competitiveness

By integrating AI into education, Kenya can better prepare its workforce to compete in the global economy. Developing skills in AI and related fields positions students and professionals to contribute to the growing digital economy, drive innovation, and participate in the global marketplace. Because not only does AI have the potential to connect Kenyan students with students from other countries, but also open better life opportunities that would otherwise have been rendered inaccessible. For example, competitions could be held online, with a number of them already existing, with rewards such as scholarships and many more.
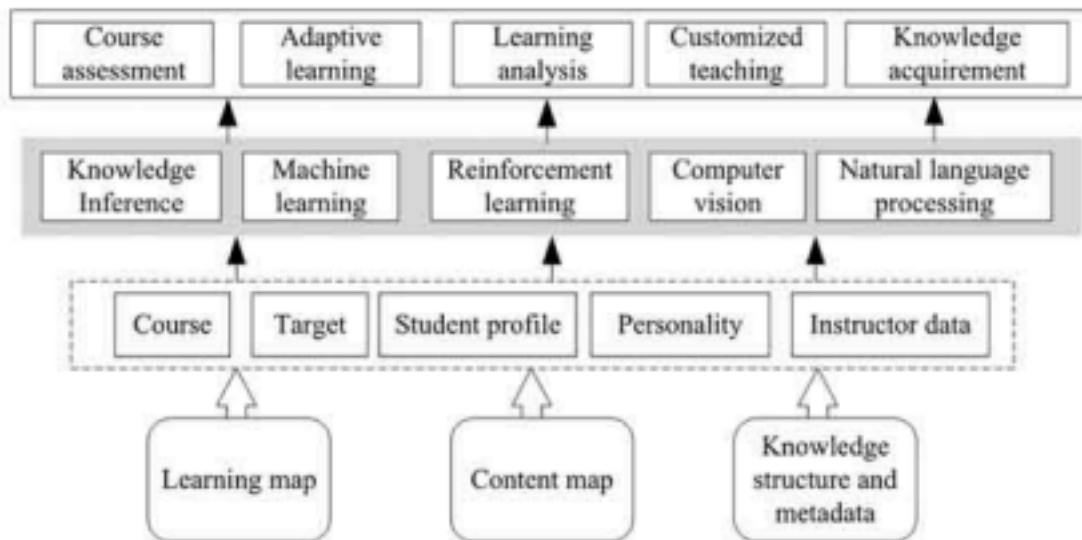
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The flowchart illustrates a summary of an AI education system which consists of teaching contents, data and intelligent algorithms. It can be divided into system models and intelligent technologies. Model building data map is crucial for improving learning, which establishes structures and association rules for collected education data. It works as a core in the system, with technologies providing power for the system.

Conclusion

Once again, we are here to convince you that A.I is the future, technological advancements will bring more good and maybe no harm to the education sector. We acknowledge that there may be some problems. We also acknowledge that we might not be able to have a perfect world, but we also acknowledge that with the solutions provided, our world is worth fighting for. The studies cited have shown that the advantages of AI in education out way any possible disadvantages that may arise from the same.

Integrating Artificial Intelligence (AI) into education in Kenya holds significant promise for revolutionizing the learning experience and addressing the myriad challenges faced by the education sector. As previously stated, AI-powered personalized learning can cater to the

diverse needs and learning paces of students, ensuring that each learner receives tailored educational content and support. This approach can help mitigate the issue of overcrowded classrooms and limited teacher-student interaction commonly seen in Kenyan schools, thereby enhancing the quality of education delivered.

Additionally, AI-driven analytics can provide valuable insights into student performance and learning trends, enabling educators to identify areas for improvement and refine teaching strategies accordingly. By leveraging data analytics, educators can better understand student strengths and weaknesses, allowing for targeted interventions to support struggling learners and challenge those who excel. Moreover, AI can assist in automating administrative tasks, freeing up educators' time to focus on more impactful aspects of teaching, such as individualized instruction and mentorship. By harnessing the power of AI, Kenya can foster a more inclusive, adaptive, and effective educational system that empowers students to thrive in the rapidly evolving digital age. Embracing AI in education is not merely a choice but a necessity for Kenya to equip its youth with the skills and knowledge needed to succeed in the 21st century. With the right investment in AI technologies and infrastructure, Kenya can position itself at the forefront of educational innovation, preparing its students to compete globally and contribute meaningfully to society.

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