

Leveraging Artificial Intelligence for Personalized Instruction and Problem-Solving in STEM Education

Friday Tietie Omene

Department of Curriculum Studies and Educational Technology, Faculty of Education and Extension Services, Usmanu Danfodiyo University, Sokoto State, Nigeria

enaks42008@gmail.com

Ibrahim Hussaini

Department of Education, Faculty of Education, University of Maiduguri, Borno State, Nigeria

hussainihib@unimaid.edu.ng

Ibaan Gogo Zalmon

Department of Mathematics/Statistics, Faculty of Natural and Applied Sciences, Ignatius Ajuru University of Education, Port Harcourt, Nigeria

zalmon.gogo@iaue.edu.ng

Abstract

The paper explores the potential of Artificial Intelligence (AI) in transforming Science Technology Engineering and Mathematics (STEM) education by offering personalized instruction and enhancing problem-solving capabilities. With roots in the theoretical developments of the 1950s, AI now supports a range of educational applications, such as intelligent tutoring and adaptive learning systems which cater for individual student needs. Traditional education often fails to accommodate the diverse learning styles and paces of students, particularly in challenging fields like STEM, where complex conceptual understanding is crucial. AI addresses these issues by personalizing learning experiences, providing interactive and gamified content, and facilitating real-world applications through simulations. Moreover, AI enhances accessibility and equity in STEM education, ensuring that underprivileged and marginalized groups can benefit from high-quality resources. The paper also highlights the importance of addressing ethical considerations and challenges associated with AI integration such as data privacy and potential biases. It also creates significant opportunities for improving engagement, efficiency in assessments, and collaboration among students. Thus,

integrating AI into STEM education holds the promise of fostering a more inclusive, adaptable and effective learning environment for the 21st-century student. The paper recommended that school proprietors should make AI technologies available to all students, especially those in the disadvantaged areas by building AI infrastructures and affordances such as reliable internet connectivity and compatible digital devices. There should be training courses arranged for teachers on how to use AI tools optimally in their classes among others.

Keywords: Leveraging, artificial intelligence, STEM education, personalized instruction, problem-solving

Introduction

Artificial Intelligence (AI) is a highly influential domain within the realm of computer systems that enables a machine to execute tasks, which would otherwise necessitate human interference, including reasoning, problem-solving, learning, and comprehending natural languages. Previously developed as a theoretical discipline during the 1950s in the US; it is now present in many fields around the world (Russell & Norvig, 2021). In the field of education development, artificial intelligence has turned out to have many practical applications such as intelligent tutors, conspectus platforms, and e-assessment. The expansion of these technologies has sparked comparisons to the transformations caused by industrial revolutions in the sense that the delivered educational content will be customized, and teachers will be able to offer more efficient instruction. AI contributes significantly in the provision of education by improving teaching and learning activity. The analysis of students' performance data obtained in an adaptive learning system makes it possible to determine and describe their advantages and disadvantages, as well as areas of their learning which have not been addressed, and provide such students with appropriate materials and interventions. Also, students who have AI tools always get proper assistance and feedback making it easy for them to learn at their own pace and in the right manner without making a lot of mistakes (Holmes et al., 2019). AI has shown great potential in Science, Technology, Engineering and Mathematics (STEM) education by providing tools for improved individualized learning, problem-solving, scientific experimentation and providing representation that enhances comprehension.

The traditional educational pedagogies and practices are faced with the challenges of managing large classes, teaching gifted or exceptional students, handling learners' individual differences, effectively carrying out personalized instruction and other unique needs of the learner. This is because of factors such as bigger class sizes, inadequate resource of teachers and strict syllabuses leading to very little differentiation and student engagement (Kay et al., 2020). These unaffordable features may create

educational gaps between students' outcomes, whereby gaps are greatest in STEM fields which are known to be more rigorous with problem and concept-based learning. One of them is the use of similar teaching approaches to all the students that does not necessarily cater for any student needs. In light of the challenges posed by utilizing conventional methods and materials, it is apparent that new solutions are necessary to achieve the desired learning results. AI makes it possible for countries education gaps to be closed by offering relevant learning and communication tools, active participation in the classroom and group activities collaboration. AI allows for higher engagement and interest in STEM through the utilization of virtual realistic labs and AI based assessments (Luckin et al., 2016). Furthermore, AI can relieve some administrative burdens from teachers which would encourage them to be more involved in mentoring as well as allowing them to be more creative in their teaching. STEM education is significant in equipping students in the 21st century. Such competencies in the modern era of globalization and rapid technological developments are essential for innovation, addressing pressing global issues and enhancing economic development (Marginson et al., 2013). Countries around the world promote STEM education in order to develop a workforce base that has problem solving, creative, and engineering skills. By embedding AI in STEM education, the learning experience is further enhanced, and students are also subsequently trained for industries that are reliant on AI. This study shall discuss the significance of AI in STEM education, challenges of STEM education, mitigating the challenges of STEM education with AI integration, implications of AI in STEM education, benefits of AI usage in STEM education, AI tools and technologies for promoting STEM education, ethical concerns and challenges in AI-enabled STEM education and future AI trends and opportunities in education.

Significance of AI in STEM Education

STEM education is becoming important in preparing students for professional careers in a world where technology is increasingly becoming prevalent. However, the effective teaching and learning of these STEM subjects face several challenges that can negatively impact the student learning and performance. AI has emerged as a game-changing force that helps to solve these issues, boost student engagement, and promote deeper learning. AI is significantly revolutionizing STEM education with ease of access to information and knowledge data base, making learning stress-free and easy.

Challenges of STEM Education

Some of the challenges of STEM education are abstract and complex concepts, diverse learning paces and styles, lack of practical application, teacher expertise and resources and gender and socioeconomic gaps as discussed below:

Abstract and complex concepts: Mathematics, algebraic equations, scientific theories, and coding languages are some of the common topics under STEM which are extremely abstract and highly technical concepts. These topics are often found uninteresting by students and difficult to apply them in real life which in turn leads to either disinterest or frustration (Devlin, 2017).

Diverse learning paces and styles: There is no denying that the rate at which students will be able to grasp the concepts of these subjects will vary. This means that while some students might have an easier time with STEM subjects, others would need more time and even assistance. In such large classroom settings, teachers face difficulties in providing this instruction and meeting the needs of the students (Kaput, 2011).

Lack of practical application: It has also been observed that most students do not see how STEM subjects are useful in everyday life. That alienation lowers their drive and motivation to learn such subjects as they often view these branches as all theory and no practice (Niss, 2018).

Teacher expertise and resources: Additional challenges for STEM educators include a lack of resources and training to implement practices that are novel, promote inclusion and cater to the diverse needs of the students in the classroom. Such limitations can result in over-reliance of old and less appealing teaching methods (Mishra & Koehler, 2006).

Gender and socioeconomic gaps: STEM fields still experience gender imbalances and socioeconomic disparities. Cultural biases and limited access to resources can discourage certain groups, particularly women and underprivileged students, from pursuing STEM education (UNESCO, 2020).

Mitigating the Challenges of STEM Education with AI Integration

AI integration in STEM education offers the following learning platforms and measures to mitigate the challenges of teaching and learning STEM subjects.

Personalized learning pathways: AI-powered platforms, such as adaptive learning systems, can analyze individual student performance and provide customized lessons tailored to their strengths and weaknesses. For instance, platforms like DreamBox and Khan Academy use AI algorithms to adjust content dynamically, ensuring that students receive the right level of challenge and support (Zawacki-Richter et al., 2019).

Interactive and gamified learning: AI tools can make STEM concepts more tangible and engaging through gamification. For example, educational software like Prodigy Math Game incorporates AI to present problems in a playful context, encouraging active participation while reinforcing key skills. Such tools transform learning into an enjoyable experience, reducing anxiety around challenging topics (Hamari et al., 2016). The following gamification could be used to improve STEM education; Quizizz, Kahoot, Socrates, ClassDojo, Worldwall, Google Form and others.

Real-world simulations and applications: AI enables the creation of simulations and virtual labs, helping students visualize and experiment with STEM principles in real-world contexts. Tools like MATLAB and AI-powered physics simulators offer hands-on opportunities to test theories, enhancing comprehension and applicability (Bishop, 2021).

Teacher support enhancement: AI can save teachers' time from administrative tasks such as grading and progress tracking, thereby allowing more time for individualized instruction. AI-based teacher professional development tools also give teachers insights and methods for improving their techniques (Holmes et al., 2019).

Enhancing diversity and equity: AI will breach the gap in education in STEM disciplines by providing free or low-cost access for high-quality learning resources-not determined by the socioeconomic standing of students themselves. For instance, IBM's Open P-TECH has provided AI endowed STEM learning materials to neglected communities, thereby making strides toward inclusivity and equity do (UNESCO, 2020).

Encouraging collaboration: AI facilitates peer-to-peer learning and teamwork with intelligent tutoring systems. These platforms encourage collaborative problem-solving using chatbots or AI tutors to guide discussion, thereby preparing students for future STEM workplaces with collaborative environments (Chen, 2020).

Implications of AI in STEM Education

Personalized learning powered by AI: The revolution in education brought about by AI lies much on tools and systems personalized to specific learning needs. With the help of data and machine learning algorithms, it enhances learning outcomes through individualized instruction, personalized just-in-time feedback, and real-time adaptive systems. Holmes et al. (2019), Luckin et al. (2016) and Hattie and Timperley (2007) stated that AI personalizes education to the diverse individual needs of learners.

Adaptive learning systems for tailoring instruction to individual students need: Adaptive learning systems employ algorithms to change how a student interacts with learning in accordance with their needs and progress. Performance data are then analyzed to find major features and predicts future learning. For example, DreamBox Learning and Smart Sparrow change lesson difficulty level and instructional approach to gain optimal learning outcome. A struggling student with fractions may demand extra visual aids with stepwise explanations while an advanced learner may solve further complex problems.

AI-driven tools for tracking student progress and identifying learning gaps: Tracking students' progress is the first step towards knowing what to intervene for a specific student. An AI for tracking such data is Google Classroom's analytification and Edmentum's Exact Path; it helps educators see the full picture of an individual student. Gaps in learning appear, thus equipping teachers to develop focused strategies for remediation. Hence such measures will mean that continuously gathered data will prevent any child's leaving behind in an environment where everyone learns differently.

Timely feedback mechanisms: The best and most important feature in an AI assessment is its provision of real-time feedback. Such immediate insights into a student's performance empower both learners and educators to make timely adjustments. For example, Gradescope and Grammarly give analyses of writing submissions almost instantly along with their suggestions for improvement. The speed not only increases understanding but also enhances healthy learning behaviors. These formats show just a few representations of artificial intelligence-based feedback systems through their immediacy, which, by the way, is particularly value-adding in STEM education, which, as a discipline, requires all students to have firm understanding bases. An example in this post is from Code.org. This presents one of the AI-based tools in a coding environment. It will show students syntax errors and give some corrective hints to encourage learning by active engagement and problem-solving.

AI is a tool for problem-solving: Artificial Intelligence (AI) is progressively becoming a revolutionizer in the manner of solving problems. It has changed the ways of tackling and solving problems in many different areas. Different researchers discussed various ways on AI in solving problems. The most important breakthroughs in artificial intelligence is the combine use of raw computing power and clever algorithms to address tough challenges. AI can be useful in breaking down large problems into smaller pieces, articulating specific steps to address such problems, and stimulating important thinking and

creativity. AI systems, through decision and neural networks, are able to analyze problems. Tools like Asana perform project management, while MATLAB is used in engineering work, as identified by Ferrucci et al. (2010). Photomath and Wolfram Alpha, on the other hand, provide step-by-step solutions, thus enhancing learning in schools and jobs related to law and medicine, as stated by Esteva et al. (2017). Also, AI encourages new ideas by showing different ways to solve problems, like Autodesk's design work in architecture and DeepMind's AlphaFold in biology (Jumper et al., 2021). It also encourages critical thinking through tools like Socratic, which help with analytical problem-solving. Additionally, AI's power to examine large amounts of data reveals patterns in fields such as climate science, offering new ways to address global issues.

Simulation and modeling in STEM fields: Simulation and modeling are key methods in STEM, and AI greatly improves their efficiency by automating data analysis and creating precise predictive models. In mathematics, AI-powered simulations enhance algorithms, solve complex equations, and study geometric shapes. Neural networks, for example, provide quicker solutions to nonlinear partial differential equations (Raissi et al., 2019). In engineering, AI models forecast how materials and structures will behave under pressure, aiding in better design improvements. Likewise, in biology, AI speeds up discoveries by analyzing intricate systems such as protein folding and gene expression patterns (Senior et al., 2020). By using huge data sets on artificial intelligence (AI), the science of the environment can encompass modeling climate change and predicting better time series trends and policy decisions for sustainability. AI in science, especially in STEM, has benefited significantly in resolving global issues such as climate change and sustainable development.

AI-powered intelligent tutoring systems for advanced problem areas: AI-oriented Intelligent Tutoring Systems (ITS) have transformed education through personalized learning experiences. Such systems apply the AI process to evaluate student understanding, to deliver targeted exercises, and to adapt real-time content delivery. Platforms like Carnegie Learning's MATHia and ALEKS make use of AI-based systems to motivate such learning and make it accessible to a wider range of students regarding advanced problem solving. With everything personalized from performance insights and feedback, students and teachers are empowered to realize better outcomes in the learning process through AI-powered ITS (VanLehn, 2011).

Benefits of AI Usage in STEM Education

Artificial intelligence (AI) has greatly changed how students learn and how teachers teach in STEM subjects. It helps solve issues like student disengagement, access to education, and the need for better

ways to assess learning. Baker et al. (2020), Darling-Hammond et al. (2020), Wheelock et al. (2020) and VanLehn (2011) stated the following ways on how AI is being used and the significant benefits it brings to STEM education.

Improved engagement and motivation: Through AI, the motivation and engagement improve the levels of STEM input. AI gives education a very interactive and personalized experience. Gamified content platforms such as Prodigy and Brainly employ AI to adapt the content and track the progress of the students, making it difficult for the topics learned to be considered boring. Simulations and a virtual laboratory by Labster are examples of AI immersion used in teaching by creating engaging experience settings in which students can experiment in their homes with a very hands-on approach. It is where all those processes will tend to facilitate learnability and retention efficacy as well as develop problem-solving skills in STEM topics.

Accessibility and equity: AI implements accessibility and equity in STEM education in assisting those developing barriers for the less privileged. Speech recognition and text-to-speech applications are two examples of AI-assisted transgression among students with disabilities. Although translation tools facilitate access to other languages, they also widen accessibility. Examples include Khan Academy and Coursera, which are AI-powered platforms providing STEM-related materials. These outlets narrow the disparity gulf existing between communities. While making learning personal, AI also affords e-learning activities to diverse learners to be successful in STEM.

Efficient assessment and feedback: The role of AI in enhancing the assessment and feedback procedure in STEM goes beyond making the process efficient; it can also make such processes very effective. Edmentum and ALEKS give students instant feedback about how they are performing, analyses of the absence of knowledge, and suggestions for the intervention of those targeted. As AI uses ongoing observation of student's progress, it supports formative assessments as the instructor adapts the teaching plan. It has automated grading and data collection; it decreases the administrative stress on the teacher, thus offering additional time for the teacher to focus on mentoring and effective teaching.

AI Tools, Platforms and Technologies for Promoting STEM Education

Artificial Intelligence (AI) is gradually dominating the education system with very high speed while transforming the landscape of Mathematics and all STEM domains. AI-equipped platforms and tools are automatically able to enable teachers to provide personalized learning experiences, enhance creativity, and build critical thinking skills in learners. This session aims at exploring the various AI

enabling platforms used in STEM, their applications in mathematics education, and how they are shaping the future of learning. AI platforms in STEM are quite vital as they emerge with interactive and adaptive tools that are engaging for diversifying learners. Here are a few examples.

Dream box learning: This platform uses AI to give personalized math instructions to individual students whose needs are addressed through adaptive algorithms by changing problem difficulty levels and providing real-time feedback to students while promoting growth at their own pace. In addition, it gives teachers insight into student performance, thus aiding in data-informed decision making (Riconscente et al., 2013).

Carnegie learning: Blended learning was a part of Carnegie Learning where software-driven instructions took place with an AI approach in classroom activities. Its Mathia software provides a step-by-step approach and seeks for student troubles as well as personalizes adaptive content for the sake of enhancing learning (Pane et al., 2017).

Google AI for Education: Another good example is that of Google AI for education. Such tools integrate AI into legacy applications like Google Classroom. For example, AI-powered Instructor tools-streamlining everything from grading to personalized quiz creation within Google Workspace-allows students to collaborate on a STEM project.

AI-driven coding and robotics tools: AI uses some of these robotic coding tools-such as Blockly and Lego Mindstorm-Beall-an example of platforms that integrate AI into self-directed learning with coding and robotics. A student can design, program and test in a real-world application, thus fostering innovative and creative ideas in STEM. Another instance is robotics competitions like those of VEX Robotics, which challenge students to apply AI to real-life scenarios.

Ethical Concerns and Challenges in AI-Enabled Education

The use of Artificial Intelligence (AI) in school can contribute to better learning in students, but in doing so, profound ethical issues arise which deserve careful attention. The biggest worries relate to how to secure data, how to ensure that AI is unbiased, and how to prepare teachers to use it. The combination of Artificial Intelligence (AI) and education creates exciting possibilities for improved learning outcomes, but this also raises practical ethical issues that must be carefully explored, including such popular issues as data protection and confidentiality, striking a balance between AI benefits and privacy intrusions, protecting data and keeping information private, balancing the benefits of AI with privacy

concerns, artificial intelligence algorithms, promoting access to education using AI, equipping educators with the skills to effectively use AI tools and supporting teachers in integrating AI into their classrooms.

Data protection and confidentiality: Most AI systems and applications require huge sets of data, personal academic records, and behavioral data which is sensitive information related to students. Therefore, safeguarding this information is critical for maintaining the confidentiality of the students. Implementation of solid data encryption methods and very severe access controls, along with keeping to regulations such as the General Data Protection Regulation (GDPR), is required for safeguarding student data (Pardo & Siemens, 2014). Data must also be anonymized as much as possible and stored securely to prevent breaches.

Striking a balance between AI benefits and privacy intrusions: AI tools, while improving learning personalization, also promote data over collection. The challenge is to strike this delicate balance, governance of data to better educational outcomes as one strives not to denude students of their privacy (Holmes et al., 2021). Involvement of different stakeholders-students, parents, and educators-in decisions about how the data shall be put in use alongside transparency in AI processes can help alleviate such concerns.

Protecting data and keeping information private: Take for example a lot of AI software and tools consume vast amounts of data, student records and behavioral behavioural data. It is critically important to maintain the security of such data to protect student privacy. Through the use of robust data encryption and regulation of access to the data and enforcing rules such as the General Data Protection Regulation (GDPR), student data privacy must be safeguarded (Pardo & Siemens, 2014). Further, where data can be anonymized, it should be so, and safely stored to prevent unauthorized access.

Balancing the benefits of AI with privacy concerns: AI tools can personalize learning, but they also can be used to collect too much data. The challenge lies in finding solutions that enable the use of data to benefit education while ensuring the privacy of students (Holmes et al., 2021). Engaging students, parents and teachers in discussions around data use and also being transparent about how AI works, can help mitigate these problems.

Artificial intelligence algorithms: Addressing Bias AI algorithms are as good as the data they train on. Historical data, therefore, means existing inequalities which can be maintained, or even perpetuated, by AI systems (Noble, 2018). For instance, predictive models could unfairly punish students belonging to underrepresented groups; arbitrarily claiming, for instance, that these students are less able to perform. Developers need to thoroughly validate AI systems against bias, and develop ways to mitigate it such as including training datasets and establishing ethical auditing standards.

Promoting access to education using AI: The gap still remains a considerable obstacle to the even-handed consideration of how AI embedding is done. Some disadvantaged students may not enjoy these facilities because they cannot afford or do not have access to the technology and the Internet to capitalize on all the features afforded by AI tools. This calls for infrastructural provisions toward not only AI systems built to meet the needs of a variety of learners but also will include building them in an adequately inclusive manner (Selwyn, 2020). Government and institutional investments must prioritize access to technology equitably.

Equipping educators with the skills to effectively use AI tools: To realize full potential of AI in education, a teacher must know how to use these tools. Professional development programs should therefore be focused on how technologies, pedagogy, and content can (and must) be combined and used by teachers to integrate AI into the classroom (Koehler & Mishra, 2009). The training should include experience using AI platforms, consideration of the ethical implications in using AI tools, and so on.

Supporting teachers in integrating AI into their classrooms: There are serious challenges for teachers in the incorporation of AI, usually with regard to shortage of resources or lack of institutional support. Continuous mentoring with technical support to create environments for collaborative learning would help teachers mitigate these risks. Institutions also need to recognize the emotional labor that teachers have to perform in taking new technologies into their lives and the context that must be built to stimulate creativity (Selwyn, 2020).

Future AI Trends and Opportunities in Education

Currently artificial intelligence is opening new horizons for education, new horizons of creativity, accessibility, research and new horizons of policy innovation that have never been experienced before. While educators and institutions keep walking down this road, artificial intelligence has, without doubt, been reshaping the way learning takes place as well as the approach to real-world problems from a

student perspective in terms of innovation. This includes some of the trends and opportunities relating to AI-driven creativity, accessibility, research tools and policy.

Creativity and innovation enhanced by AI: AI-based tools such as generative models, adaptive learning systems, and real-time design systems are actively bringing thought, problem-solving, and creativity to the hands-on lab, individualized learning experiences for the student. Breakthrough techniques-enabled innovation come from tools like ChatGPT or DALL-E, motivating students content brainstorming and coming up with interesting application cases like visualization through tools like CoSpaces Edu. Adaptive systems, like DreamBox and Smart Sparrow, can also provide them with adaptive content, according to the user's preferred style of learning so that interdisciplinary concepts can be developed, by exploring areas not pertaining to subject disciplines. Indeed, such technologies support cycles of learning and allow learners to refine their thoughts and generate rather creative solutions (Huang et al., 2023).

AI accessibility and inclusion: This technology opens up the education space by paving ways for learners with diverse needs so that they can cope developmentally with students who have different needs such as using tools like speech-to-text for people with physical disabilities or visual aids for impairments (Seale, 2022). Different tools such as Microsoft Immersive Reader and Grammarly help a neurodiverse learner by defining the complex texts and improving clarity. AI tutors such as Carnegie Learning's MATHia provide adaptive feedback, making it easy to grasp difficult concepts at one's own speed. Additionally, Google Translate and other AI translation applications, combined with embedded technologies such as virtual reality and augmented reality, formulate an inclusive culture that overcomes linguistic as well as socio-economic barriers to achieve a symmetrical environment for learning.

AI and research: This enabled the students to do their independent research because they can easily access and analyze information: with the help of such tools like Zotero and Mendeley, which suggest information resources, automate citation, and classify materials in an efficient way. Such online platforms as Google Scholar and Semantic Scholar are boosting multidisciplinary inquiry while encouraging self-research and critical appraisal (Smith & Johnson, 2023). Tools such as Tableau or IBM SPSS drive the analysis of these enormous databases in order to identify and explain trends and trends that would form the basis for sophisticated investigations in various fields. Such techniques would introduce a revolution into the research process while equipping students to make the necessary decisions using data (Brown et al., 2022).

Policy and collaboration: The policies of the government and institutions have played their important role in making the AI education integration possible in terms of equal access, data privacy, and ethical practice of AI tools. According to UNESCO guidelines, training in AI technologies should be given to educators while safeguarding students' rights (UNESCO, 2021). Investments in professional development of teachers are critical for proper use of AI in creativity and inclusion. Government-public partnerships such as those made at the hands of Microsoft and Google universities are further speeding up the adoption of AI in education systems, especially in STEM subjects, paving the way for innovations that can be built into a sustainable ecosystem, which will close the gap between what is learned and how that learning goes on to be applied in real life.

Conclusion

AI can play a transformative role in STEM education, by providing personalized learning experiences, helping automate administration tasks, and delivering interesting information in areas of student performance. Its capability to meet the unique learning of students and to improve the student's motivation makes it an effective tool for both teachers and students. Nevertheless, some challenges and limitations should be weighed, for example, considerations regarding privacy and the digital divide as well as the need for teachers to be adequately prepared in how to incorporate algorithms into the classroom. Providing for these challenges is going to demand a delicate tradeoff between innovation and protecting the values of the educational process. However, AI-based learners are poised to undergo future changes, as machine learning, natural language processing, and intelligent tutoring systems continue to progress, further enhancing the learning experience. The application of AI to education promises more adaptive, effective, and equitable learning environments. To embody the full potential of AI, educators, policymakers, and researchers need to work together to develop best practices, deliver professional development, and provide equitable access to technology. Working together they can create a path towards a future when AI benefits every learner.

Suggestions

1. There should be training courses arranged for teachers on how to use AI tools optimally in teaching STEM subjects.
2. Proprietors of schools should make AI technologies available to all students, especially those in the disadvantaged areas by building infrastructures such as a reliable internet connectivity and compatible digital devices.

3. Data privacy and ethical considerations should be emphasized by developers and educators to keep student information secure and remove bias from AI algorithms.
4. There should be effective collaboration between educators, AI developers and policymakers in the design of AI tools aimed at addressing specific needs of STEM education.
5. Evaluation on a regular basis should be made regarding the effectiveness of AI tools on learning outcomes with updates and improvement practices driven by feedback from students and teachers.
6. Teachers should integrate AI in STEM education to enhance personalized learning, problem-solving skills and boost performance of students.

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