



Assessing the Role of Artificial Intelligence in the Teaching-learning Process

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/acri/2025/v25i71361>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://pr.sdiarticle5.com/review-history/138753>

Original Research Article

Received: 07/05/2025

Accepted: 09/07/2025

Published: 16/07/2025

ABSTRACT

Background: Artificial Intelligence (AI) is rapidly emerging as a transformative force in education, holding the potential to revolutionise the traditional teaching-learning process. Far from merely automating existing tasks, AI promises to usher in an era of personalised learning, enhanced efficiency for educators, and enriched engagement for students. While challenges and ethical considerations remain, the trajectory of AI's integration into education points towards a future where learning is more accessible, effective, and tailored to individual needs than ever before. One of the most significant contributions of AI to education lies in its capacity for personalised learning. Traditional classrooms often struggle to cater to the diverse learning paces, styles, and needs of individual students. AI-powered adaptive learning platforms and intelligent tutoring systems (ITS)

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bridge this gap by analysing student performance data in real-time. They can identify a student's strengths and weaknesses, adapt content difficulty, provide immediate and targeted feedback, and suggest additional resources or alternative explanations.

Aims: The aim of this study is to investigate the role of AI in enhancing the teaching-learning process, focusing on Personalised Learning, Administrative Efficiency for Educators, and Student Engagement.

Methodology: This study used a mixed-methods approach, combining qualitative and quantitative research designs. A purposive sample of 100 respondents was selected, and data were collected using Google Forms. Regression analysis was used for quantitative data, while qualitative analysis provided in-depth insights into AI's role in personalised learning, administrative efficiency, and student engagement.

Findings: The result showed that out of 100 respondents, there were 63 per cent male educators and 37 per cent female educators those were used Artificial Intelligence as a tool in the teaching-learning process. The personalised learning, Learning efficiency and Student engagement variables explain 44.2 per cent (boys) and 43.1 per cent (girls) variance of AI in education. This individualised approach ensures that struggling students receive the necessary support, while advanced learners are challenged with more complex material, fostering deeper understanding and improved academic outcomes. Tools like Khanmigo and Duolingo exemplify how AI can act as a tireless, patient tutor, offering round-the-clock assistance and tailored learning paths. Beyond personalisation, AI significantly enhances administrative efficiency for educators. Teachers often spend a substantial portion of their time on repetitive, time-consuming tasks such as grading assignments, tracking attendance, and generating reports. AI can automate these processes, freeing up valuable time that teachers can then redirect towards direct instruction, mentorship, and fostering stronger student relationships.

Conclusion: AI-powered grading systems can provide instant feedback, allowing students to understand their mistakes and make immediate corrections. Furthermore, AI can assist in lesson planning, content creation, and even generating diverse assessment questions, enabling teachers to focus on the human-centric aspects of their profession. The impact of AI extends to improving student engagement. AI-driven tools can create more interactive and dynamic learning experiences. Gamified learning platforms, virtual reality (VR) and augmented reality (AR) simulations, and AI chatbots can make lessons more immersive and enjoyable.

Keywords: Personalised learning; educators; student; artificial intelligence; learning experiences.

1. INTRODUCTION

The traditional classroom, with its one-size-fits-all approach, has long struggled to cater to the diverse learning styles, paces, and needs of individual students. This inherent limitation often leads to disengagement, underperformance, and a failure to unlock each learner's full potential. Over the past decade, artificial intelligence (AI) has emerged as a transformative force across various sectors, notably in education (Merino-Campos, 2025; Sapci & Sapci, 2020). The advent of Artificial Intelligence (AI) is ushering in a revolutionary paradigm shift, transforming education from a standardised delivery system into a deeply personalised and adaptive experience. AI's capacity to analyse vast datasets, identify patterns, and predict outcomes is proving instrumental in creating learning environments that are not just responsive, but proactively tailored to each student, promising a

future where education is truly bespoke (Kim & Kim, 2022).

One of AI's most significant contributions to personalised learning lies in its ability to provide dynamic and instantaneous assessment. Unlike traditional tests that offer a snapshot of knowledge, AI-powered platforms can continuously monitor student progress, identify areas of struggle in real-time, and pinpoint the root cause of misunderstandings. Through sophisticated algorithms, these systems can analyse everything from response times and click patterns to the types of errors made, offering a far more granular understanding of a student's cognitive processes. This immediate feedback loop allows for timely interventions, preventing misconceptions from solidifying and ensuring that learning gaps are addressed before they widen (Kaswan et al., 2024; Chen & Perez, 2023).

AI-driven educational platforms can collect and analyse data on student performance, enabling educators to make informed decisions to enhance their teaching (Wong et al., 2020). AI excels at crafting individualised learning paths. By analysing a student's past performance, learning preferences (e.g., visual, auditory, kinesthetic), and even their emotional state, AI can dynamically curate content, recommend resources, and suggest activities that are optimally suited to their unique profile. For a visual learner struggling with a concept, the AI might suggest an animated video or an interactive simulation. For a student who thrives on hands-on experience, it might be recommended a virtual lab or a problem-solving exercise. This adaptive curriculum not only makes learning more engaging but also significantly more effective, as it aligns with how each student naturally acquires and processes information (Malik, 2023).

Beyond content delivery, AI plays a crucial role in providing intelligent tutoring. AI-powered tutors can emulate human educators by offering personalised explanations, answering questions, and even engaging in Socratic dialogues to prompt deeper critical thinking. These systems can identify common student errors and proactively provide targeted remediation or offer additional examples and practice problems to reinforce understanding. Unlike human tutors who have limited availability, AI tutors can provide 24/7 support, allowing students to learn at their own convenience and revisit challenging topics as many times as needed without fear of judgment (Alqahtani et al., 2023).

Moreover, AI's predictive analytics capabilities hold immense promise in personalised learning. By analysing historical data and current performance, AI can identify students who are at risk of falling behind, disengaging, or even dropping out. This early warning system allows educators and institutions to intervene proactively, offering targeted support, counselling, or alternative learning strategies before a crisis point is reached. This predictive power not only benefits individual students but also enables educational institutions to optimise their resources and improve overall student success rates (Baidoo-Anu & Owusu 2023).

However, the implementation of AI in personalised learning is not without its challenges. Concerns regarding data privacy and security are paramount, as these systems collect

vast amounts of sensitive student information. Ensuring equitable access to AI-powered tools is also crucial to avoid widening the digital divide (Moharana, 2025). Furthermore, while AI can personalise content and delivery, it cannot fully replicate the nuanced human interaction, empathy, and holistic development fostered by dedicated educators. The role of the human teacher will undoubtedly evolve, shifting from a disseminator of information to a facilitator, mentor, and guide, leveraging AI as a powerful tool to enhance their instructional capabilities (Muyideen et al., 2023).

Artificial Intelligence is poised to revolutionise personalised learning, transforming education from a rigid, standardised system into a dynamic, adaptive, and highly individualised experience. By offering instantaneous assessment, tailoring learning paths, providing intelligent tutoring, and leveraging predictive analytics, AI can unlock each student's full potential, making learning more engaging, effective, and equitable. While challenges remain, the judicious integration of AI into educational frameworks promises a future where every learner can embark on a truly bespoke educational journey, preparing them more effectively for the complexities of the 21st century (Mahmoud & Sørensen, 2024; Cope et al., 2020).

One of the most immediate and tangible benefits of AI in educational administration lies in automating routine and repetitive tasks. Educators often spend considerable time on scheduling, attendance tracking, grading multiple-choice questions, and managing student records. AI-powered systems can automate these processes with remarkable accuracy and speed. For instance, AI-driven scheduling software can optimise timetables, considering teacher availability, classroom capacity, and student needs, thereby eliminating complex manual planning. Similarly, automated attendance systems, using facial recognition or RFID technology, can record student presence instantly and accurately, reducing errors and saving precious classroom time (Sa-ad et al., 2025).

In the 21st century, however, a new paradigm is emerging, driven by the immersive capabilities of Virtual Reality (VR) and Augmented Reality (AR) simulations. These groundbreaking technologies are rapidly transforming education, offering unprecedented opportunities for experiential learning, personalised instruction, and a more

dynamic and effective pedagogical landscape (Yue et al., 2022).

One of the most significant contributions of VR and AR in education is their ability to provide experiential learning opportunities that were previously impossible or impractical. Imagine medical students practising complex surgeries in a risk-free virtual environment, allowing them to refine their techniques and build confidence without endangering real patients. Similarly, aspiring engineers can design and test structures in a simulated world, identifying flaws and optimising designs before committing to physical prototypes. History students can virtually walk through ancient Rome, exploring its architecture and daily life, far surpassing the passive experience of reading a textbook. These immersive simulations bridge the gap between theoretical knowledge and practical application, fostering a deeper, more intuitive understanding of complex concepts (Hwang et al., 2020).

Beyond practical skills, VR and AR simulations are powerful tools for enhancing engagement and motivation. The novelty and interactivity of these technologies naturally captivate students, transforming potentially dry subjects into exciting adventures. A biology lesson on the human circulatory system becomes infinitely more engaging when students can virtually shrink down and navigate through arteries and veins, observing blood flow in real-time. This active participation, where students are not just passive recipients of information but active explorers, significantly improves retention and fosters a genuine curiosity for learning. The gratified elements often incorporated into these simulations further boost motivation, turning learning into a rewarding and enjoyable experience (AlGerafi et al., 2023).

Furthermore, VR and AR offer immense potential for personalised learning and accessibility. Students learn at different paces and through various modalities. VR simulations can be tailored to individual needs, allowing students to repeat complex procedures, explore concepts from multiple angles, or focus on areas where they struggle, all at their own speed. For students with learning disabilities or those who struggle with traditional classroom settings, the immersive and multi-sensory nature of VR and AR can provide alternative pathways to understanding, accommodating diverse learning styles. Moreover, these technologies can democratize access to high-quality educational experiences

that might otherwise be geographically or financially out of reach. Students in remote areas can now virtually attend world-class university labs or experience global landmarks, broadening their horizons significantly.

However, the widespread adoption of VR and AR in education is not without its challenges. Cost remains a significant barrier, as VR headsets and AR devices, along with the development of sophisticated simulations, can be expensive. Technical expertise is also required for effective implementation and ongoing maintenance. Additionally, careful consideration must be given to the design and pedagogical soundness of these simulations to ensure they are truly educational and not merely entertaining distractions. Educators need training to effectively integrate these tools into their curriculum and leverage their full potential. Finally, while immersion is a strength, ensuring a balance with real-world interactions and preventing excessive screen time is crucial for holistic development.

Despite these hurdles, the trajectory for VR and AR in education is undeniably upward. As the technology becomes more affordable and accessible, and as educators gain more experience in leveraging its power, we can expect to see an even more profound impact. The future of education envisions classrooms where students are not confined to static desks but are actively exploring virtual worlds, collaborating on augmented projects, and gaining hands-on experience in dynamic, engaging environments. VR and AR simulations are not merely supplementary tools; they are foundational elements that are reshaping the very definition of learning, preparing students not just with knowledge but with the practical skills, critical thinking, and adaptability necessary to thrive in an increasingly complex world.

AI significantly improves data management and analysis. Educational institutions generate vast amounts of data, from student performance metrics to resource utilisation. AI algorithms can process this data, identify trends, and generate insightful reports that would be laborious and time-consuming for humans to compile. This includes tracking student progress, identifying learning gaps across cohorts, and even predicting potential academic challenges for individual students. Such predictive analytics allow educators to intervene proactively, offering targeted support and preventing academic

setbacks. This data-driven approach to administration empowers educators to make more informed decisions regarding curriculum development, resource allocation, and individualised learning plans (Olaf et al., 2019).

1.1 Problem Statement

This work assesses the role of Artificial Intelligence in the teaching-learning Process. There are so many researchable questions, such as: i) Does AI help in personalised learning? ii) Does AI enhance administrative efficiency for educators? iii) Does AI improve student engagement? Nowadays, Artificial Intelligence is playing a vital and prominent role in the teaching and learning process. Therefore, to find out these researchable questions, the present study was undertaken under the following objectives:

1.2 Objectives of the Study

- i) To study the role of AI in personalised learning.
- ii) To study the role of AI in administrative efficiency for educators.
- iii) To study the role of AI in student engagement.

2. LITERATURE REVIEW

Hwang et al. (2020): Artificial Intelligence (AI) enhances efficiency in communication and personalised feedback. While direct teacher-student interaction remains paramount, AI tools can assist in managing routine communications. AI-powered chatbots can answer frequently asked questions from students and parents regarding school policies, deadlines, or general information, reducing the administrative burden on educators.

Holmes et al. (2022): AI can aid in providing personalised feedback on assignments. While not replacing the nuanced feedback of a human educator, AI tools can quickly identify common errors, suggest improvements in grammar or style, and even grade objective assessments, allowing educators to focus their energy on providing qualitative, in-depth feedback that requires human judgment. Imagine students taking virtual trips to historical sites or interacting with AI-powered historical figures to deepen their understanding of a subject. This heightened engagement can motivate students, foster a love for learning, and lead to better retention of knowledge.

Cope et al. (2020): The integration of AI into education is not without its challenges and considerations. Data privacy and security are paramount concerns, as AI systems often require access to vast amounts of sensitive student data. Robust safeguards and adherence to strict privacy regulations are essential to build trust and prevent misuse.

Yue et al. (2022): Potential biases in AI algorithms pose another critical challenge. If the data used to train AI systems contains inherent biases, the AI can perpetuate or even amplify these biases, leading to unfair outcomes, such as biased grading or unequal access to resources. Regular auditing and ethical development of AI are crucial to mitigate these risks.

Baidoo & Owusu (2023): There is a concern about the potential reduction in human interaction. While AI can provide excellent support, it cannot fully replace the invaluable human elements of teaching, such as empathy, critical thinking development, and the nuanced mentorship that a human teacher provides.

Chen et al. (2020): Maintaining a balance between AI tools and meaningful teacher-student interaction is vital for holistic student development. Cost and accessibility also present hurdles, as implementing and maintaining advanced AI systems can be expensive, potentially widening the digital divide between well-resourced and underserved communities.

Zawacki et al. (2019): Issues of academic integrity arise, as students may be tempted to misuse AI tools for cheating or to avoid developing critical thinking skills. Clear policies and ethical guidelines are necessary to promote responsible AI use.

3. MATERIALS AND METHODS

The qualitative as well as quantitative research designs were used. For the current research work, a total of 100 respondents were selected purposively. The questionnaire method was used for the purpose of the data collection, and Google Forms were sent to the respondents for data collection. Regression analysis was used to analyse the quantitative data. On the other hand, qualitative analysis detailed explanation that provides a better understanding of Personalized learning, Learning efficiency and student engagement in Artificial Intelligence.

4. RESULTS & DISCUSSION

Table 1. Distribution of respondents according to gender (n=100)

Gender of Respondents		
Gender	Frequency	%
Boys	63	63%
Girls	37	37%

It can be observed from Table 1 that out of 100 respondents, there were 63 per cent male educators and 37 per cent female educators (respondent) those were used Artificial Intelligence as a tool of teaching learning process.

It can be observed from Table 2 that there were 20 per cent respondents of age group 15-17 and 60 per cent respondents were of age group 18-20 while 20 per cent were in the age-group 20-25.

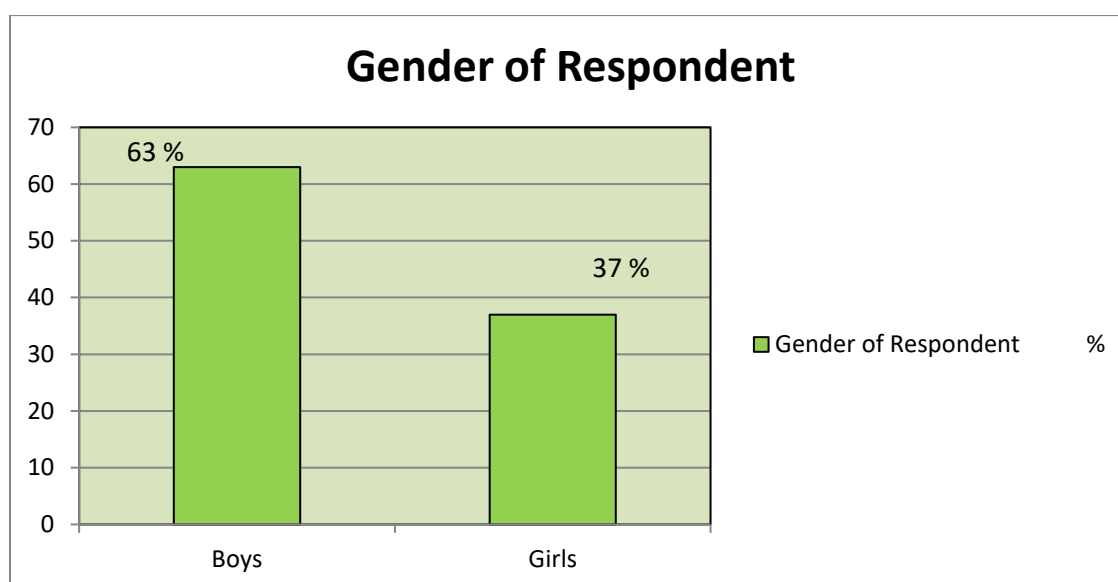


Fig. 1. Gender of respondents

Source: Primary Source

Table 2. Distribution of respondents according to Age(n=100)

Age of Respondents		
Age	Frequency	%
15-17	20	20
18-20	60	60
20-25	20	20

Source: Primary Source

Table 3. Distribution of respondents according to regression analysis regarding the used of artificial intelligence (n=100)

	Regression Analysis	
	Boys	Girls
R ²	0.393	0.396
F	33.405*	37.839*
Constant	0.289	0.301
Personalized learning	0.198*	0.008
Learning efficiency	0.006	0.296*
Student engagement	0.290*	0.196***

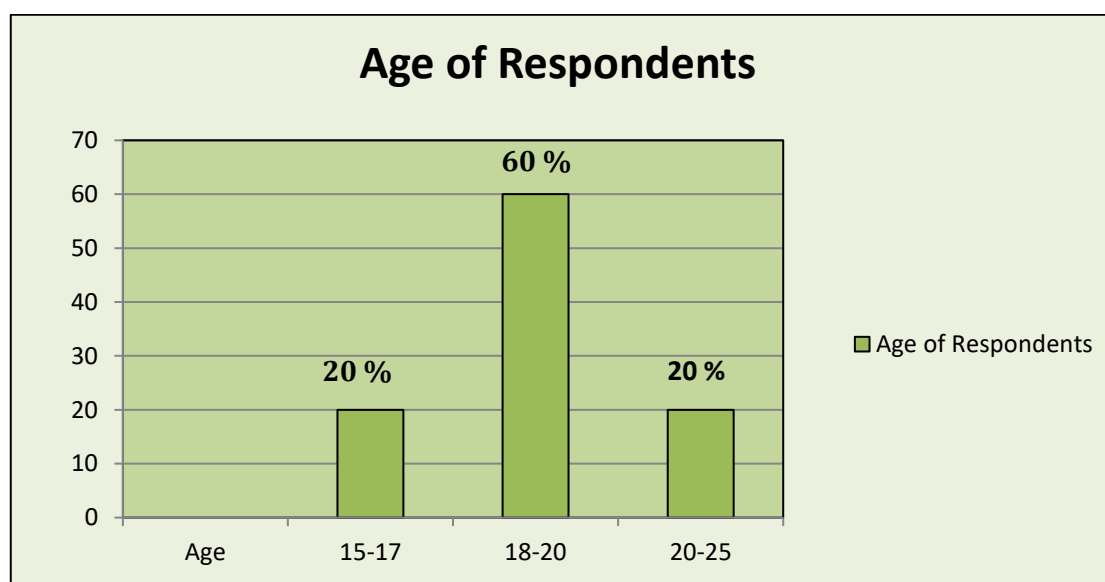


Fig. 2. Age of respondents

Source: Primary Source

Table 3 shows that the personalized learning, Learning efficiency and Student engagement variable explain 44.2 per cent (boys) and 43.1 per cent (girls) variance of AI in education.

In an era defined by rapid technological advancement, Artificial Intelligence (AI) has emerged as a transformative force across numerous sectors, with education being a particularly fertile ground for its application. Beyond simply automating tasks, AI holds immense potential in revolutionising the learning experience, specifically by significantly enhancing student engagement.

One of the most profound contributions of AI to student engagement lies in its capacity for personalised learning. Traditional classrooms, often constrained by a one-size-fits-all approach, struggle to cater to the diverse learning styles, paces, and prior knowledge of individual students. AI-powered platforms can meticulously analyse student performance data, identify areas of strength and weakness, and then dynamically adapt content and delivery methods. This hyper-personalisation ensures that students are consistently challenged at an appropriate level, preventing both boredom from overly simplistic material and frustration from insurmountable obstacles. When learning is tailored to individual needs, students are more likely to feel a sense of ownership over their educational journey, fostering intrinsic motivation and deeper engagement.

Intelligent tutoring systems (ITS), a sophisticated application of AI, play a crucial role in mimicking and often surpassing the capabilities of human tutors. These systems can provide immediate, one-on-one support, explaining complex concepts, offering hints, and guiding students through problem-solving processes. Unlike human tutors who may be limited by time or availability, ITS can be accessed anytime, anywhere, providing continuous support. This constant availability of personalised guidance reduces feelings of isolation and inadequacy, encouraging students to persist through challenging material and actively participate in their learning rather than passively receiving information. The interactive nature of these systems, often involving dialogue and immediate feedback, creates a more engaging and less intimidating learning environment.

Artificial Intelligence is not merely a supplementary tool but a foundational element in reimagining and enhancing student engagement in education. Through personalised learning pathways, sophisticated intelligent tutoring systems, engaging gamified experiences, and instant, actionable feedback, AI empowers students to become active participants in their learning journeys. As AI continues to evolve, its potential to create more dynamic, individualised, and inherently engaging educational experiences will undoubtedly grow, shaping a future where learning is not just about acquiring knowledge

but about fostering a lifelong passion for discovery and understanding.

The landscape of education is undergoing a profound transformation, driven by technological advancements that promise to personalise learning and cater to the diverse needs of students. Among these innovations, Intelligent Tutoring Systems (ITS) stand out as powerful tools poised to revolutionise how knowledge is imparted and acquired. Far beyond simple digital textbooks or drill-and-practice software, ITS leverages artificial intelligence to provide tailored, adaptive, and interactive learning experiences, effectively acting as a digital "guiding hand" for individual learners. Their multifaceted role extends from personalising instruction and enhancing engagement to providing insightful feedback and democratizing access to quality education.

One of the most significant contributions of ITS lies in its ability to personalise the learning journey. Traditional classroom settings, with their inherent limitations in instructor-to-student ratios, often struggle to address the unique learning styles, paces, and knowledge gaps of each individual. ITS overcomes this by employing sophisticated algorithms to build and maintain a detailed student model, tracking their strengths, weaknesses, misconceptions, and progress. Based on this model, the system dynamically adjusts the content, difficulty, and instructional strategies, ensuring that learners are presented with material that is neither too challenging nor too simplistic. This adaptive learning approach fosters deeper understanding and prevents both frustration and boredom, ultimately optimising the learning outcome for every student.

Furthermore, ITS plays a crucial role in enhancing student engagement and motivation. Unlike passive learning environments, ITSs are designed to be interactive, often incorporating gamified elements, simulations, and problem-solving scenarios. By providing immediate feedback, explanations, and hints, ITS creates a dynamic dialogue with the learner, fostering an active learning process. This continuous interaction keeps students actively involved in their own education, transforming them from passive recipients of information into active participants in knowledge construction. The sense of agency and control that ITS offers, combined with the personalised challenge, can significantly boost intrinsic motivation and a desire to learn.

The provision of timely and specific feedback is another cornerstone of ITS's efficacy. In conventional classrooms, feedback from instructors can often be delayed or generalised. ITS, however, offers instantaneous and precise feedback on student responses, explaining not just whether an answer is right or wrong, but *why*. This immediate corrective guidance allows students to identify and rectify their misconceptions in real-time, preventing the entrenchment of errors. Moreover, many ITS go beyond simple error correction, offering detailed explanations, alternative approaches, and even personalised remediation strategies, guiding students towards a deeper conceptual understanding.

ITS also holds the potential to democratize access to quality education. For students in remote areas, those with learning disabilities, or individuals seeking to learn outside of traditional academic structures, ITS can serve as an invaluable resource. They can provide access to expert-level instruction that might otherwise be unavailable, bridging geographical and socioeconomic gaps. This accessibility empowers individuals to pursue continuous learning and skill development, contributing to a more equitable and knowledgeable society.

It is crucial to acknowledge that the role of ITS is not to replace human educators but rather to augment and enhance their capabilities. While ITS excel at delivering personalised content and providing immediate feedback, they may not fully replicate the nuanced understanding of a student's emotional state, the ability to inspire through personal anecdotes, or the fostering of collaborative learning environments that human teachers provide. Instead, the most effective educational models will likely involve a synergistic blend of human instruction and ITS, with teachers leveraging the data and insights provided by ITS to better inform their classroom strategies and focus on higher-order pedagogical tasks.

Intelligent Tutoring Systems are more than just advanced educational software; they are transformative tools that are reshaping the very fabric of learning. By offering personalized instruction, fostering engagement, providing immediate and specific feedback, and democratizing access to education, ITS are empowering learners to reach their full potential. As technology continues to evolve, the role of ITS will only grow in significance, paving the

way for a future where education is truly tailored to the individual, effective, and accessible to all.

In recent years, Artificial Intelligence (AI) chatbots have emerged as a transformative force, moving beyond their initial applications in customer service to carve out a significant and increasingly indispensable role within the educational sphere. From personalised learning experiences to administrative streamlining, AI chatbots are reshaping how students learn, how educators teach, and how institutions operate, promising a future where education is more accessible, engaging, and effective.

One of the most profound contributions of AI chatbots lies in their ability to facilitate personalised learning. Traditional classrooms, often constrained by teacher-student ratios, struggle to cater to the diverse learning styles and paces of individual students. Chatbots, however, can provide round-the-clock, individualised support. They can act as tireless tutors, offering explanations, answering questions, and providing instant feedback on assignments. By analysing a student's responses, chatbots can identify areas of weakness and provide targeted exercises or remedial materials, adapting the learning path to suit specific needs. This adaptive learning capability not only boosts comprehension but also fosters a sense of agency in students, allowing them to progress at their own optimal speed, unburdened by the pressure of keeping up with a class or waiting for a teacher's availability.

Beyond personalised tutoring, AI chatbots are proving invaluable in augmenting access to information and resources. Students can query chatbots for definitions, historical facts, scientific principles, or even complex equations, receiving immediate and accurate responses. This instant access to knowledge democratizes learning, especially for students in remote areas or those with limited access to traditional libraries and resources. Furthermore, chatbots can serve as intelligent navigators through vast digital libraries, helping students locate relevant research papers, articles, and multimedia content, thereby streamlining the research process and promoting deeper inquiry.

The administrative burden on educators is another area where AI chatbots offer significant relief. Tasks such as answering frequently asked

questions about course logistics, deadlines, or syllabus details can be automated by chatbots, freeing up teachers to focus on more complex pedagogical activities like lesson planning, student mentorship, and critical thinking development. Chatbots can also assist with scheduling, reminding students of important dates, and even providing preliminary grading for certain types of assignments, thus improving efficiency and allowing educators to dedicate more time to direct student interaction and qualitative feedback.

However, the integration of AI chatbots into education is not without its challenges. Concerns regarding data privacy and security are paramount, as chatbots often handle sensitive student information. The potential for over-reliance on chatbots, leading to a diminished capacity for independent problem-solving or critical thinking, is another valid apprehension. Ethical considerations surrounding bias in AI algorithms and the need for human oversight to ensure equitable and inclusive learning experiences also demand careful attention. It is crucial to remember that chatbots are tools, not replacements for human educators, whose empathy, nuanced understanding, and ability to foster genuine human connection remain irreplaceable.

Looking ahead, the role of AI chatbots in education is poised for even greater expansion. We can anticipate more sophisticated chatbots capable of engaging in Socratic dialogue, stimulating higher-order thinking, and even facilitating collaborative learning experiences. As natural language processing and machine learning continue to advance, chatbots will become even more adept at understanding complex queries and generating nuanced, contextually relevant responses. The future may see chatbots acting as virtual teaching assistants, co-designing curricula, and providing real-time analytics on student engagement and progress.

AI chatbots are rapidly evolving from novelties to essential components of the educational ecosystem. Their capacity for personalisation, instant information access, and administrative support offers unprecedented opportunities to enhance learning outcomes and create more equitable and efficient educational environments. While challenges related to ethics, privacy, and the appropriate balance between human and artificial intelligence must be diligently

addressed, the transformative potential of AI chatbots in shaping the future of education is undeniable. As we move forward, a thoughtful and strategic integration of these intelligent tools will be key to unlocking their full promise, fostering a generation of learners who are more engaged, empowered, and prepared for the complexities of the 21st century.

One of the most significant advantages of e-learning lies in its unparalleled flexibility. Unlike conventional schooling, which often adheres to rigid schedules and fixed locations, e-learning platforms empower learners to access educational materials at their own pace and convenience. This asynchronous nature is particularly beneficial for working professionals, individuals with family responsibilities, or those residing in remote areas, enabling them to pursue higher education or acquire new skills without disrupting their existing commitments. The ability to revisit lectures, re-read materials, and complete assignments according to individual learning rhythms fosters a less stressful and more effective learning environment.

Furthermore, e-learning dramatically enhances accessibility to quality education. Geographical barriers, once formidable obstacles, are virtually eliminated. Students from diverse backgrounds and distant corners of the globe can enrol in prestigious courses and programs offered by world-renowned institutions, democratizing access to knowledge previously reserved for a select few. This increased reach is particularly impactful in developing nations or underserved communities, where traditional educational infrastructure may be limited. Moreover, e-learning platforms often incorporate features that cater to diverse learning needs, such as closed captions, audio descriptions, and customizable display options, promoting inclusivity for learners with disabilities.

Beyond flexibility and accessibility, e-learning fosters a more personalised learning experience. Traditional classrooms, with their one-size-fits-all approach, often struggle to cater to the unique learning styles and paces of individual students. E-learning, however, leverages adaptive learning technologies and data analytics to tailor content and assessments to each learner's strengths and weaknesses. This personalised pathway can identify areas where a student needs more support, provide targeted resources, and offer challenging material when a concept is mastered

quickly. This individualised attention, difficult to achieve in a large physical classroom, significantly enhances engagement and comprehension.

However, the rise of e-learning is not without its challenges. The absence of face-to-face interaction can sometimes lead to feelings of isolation and a lack of immediate feedback from instructors. Maintaining motivation and discipline in a self-directed learning environment can also be a hurdle for some students. Additionally, equitable access to reliable internet connectivity and digital devices remains a significant concern in many parts of the world, creating a digital divide that could exacerbate existing educational inequalities. The quality of online content, the effectiveness of virtual assessments, and the need for robust cybersecurity measures are also crucial aspects that require continuous attention and improvement.

5. SUMMARY & CONCLUSION

Artificial Intelligence (AI) can play a vital role in resource optimization and operational management. From managing library resources and laboratory equipment to overseeing facility maintenance, AI-driven systems can track inventory, predict maintenance needs, and optimise resource allocation, leading to cost savings and improved operational flow. This allows educators to focus on their primary role of teaching rather than getting bogged down in logistical complexities.

The integration of gamification with AI further amplifies student engagement. AI can be used to design sophisticated educational games that are not only entertaining but also highly effective in achieving learning objectives. By incorporating elements like points, badges, leaderboards, and interactive challenges, AI-powered gamified learning platforms can transform mundane tasks into exciting quests. AI can dynamically adjust the difficulty of game levels based on student performance, ensuring a continuous optimal challenge. This playful approach taps into students' natural competitive instincts and desire for achievement, making the learning process feel less like a chore and more like an enjoyable pursuit, thereby significantly boosting engagement and retention.

AI's ability to provide real-time feedback is instrumental in fostering a more engaged learning environment. Traditionally, students

often had to wait days or even weeks for feedback on assignments, by which time their initial understanding of the material might have faded. AI can process and analyse student submissions instantly, offering immediate insights into their performance. This includes identifying specific errors, suggesting alternative approaches, and even providing explanations for correct answers. Prompt feedback allows students to rectify misconceptions immediately, reinforce correct understanding, and actively track their progress. This continuous feedback loop creates a sense of accountability and encourages students to take a more proactive role in their learning, leading to sustained engagement.

It is crucial to acknowledge that the successful integration of AI in educational administration requires careful planning and implementation. Issues such as data privacy, algorithmic bias, and the need for appropriate training for educators must be addressed. AI should be viewed as a tool to augment human capabilities, not replace them. The goal is to free educators from mundane administrative tasks, allowing them to dedicate more time and energy to fostering student engagement, personalised learning, and professional development.

6. SUGGESTIONS

The future of AI in education is one of continued evolution and integration. We can anticipate more sophisticated personalised learning systems, more intelligent tutoring that adapts not just to content but also to a student's emotional state, and AI tools that empower teachers to become even more effective facilitators of learning. AI is unlikely to replace teachers but rather to augment their capabilities, transforming their roles from primary knowledge disseminators to guides, mentors, and facilitators of inquiry-based learning. By proactively addressing the ethical considerations and focusing on human-centred design, AI can truly unlock the full potential of every learner, creating a more equitable, engaging, and effective educational landscape for generations to come.

Artificial Intelligence holds immense potential to revolutionise administrative efficiency for educators. By automating routine tasks, enhancing data management, streamlining communication, and optimising resource allocation, AI empowers educators to reclaim

valuable time and focus on their core mission: educating and nurturing the next generation. As AI technologies continue to evolve, their strategic implementation will be key to creating a more efficient, supportive, and ultimately, more effective educational ecosystem.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of this manuscript. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology.

Details of the AI usage are given below:

1. Google search (Reviews & Authentic material)

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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