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2. The Influence Of Artificial Intelligence On Students' Learning And Academic Performance In Higher Education

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Abstract

Artificial Intelligence is significantly transforming higher education by reshaping instructional practices, learning processes, and academic outcomes. This comprehensive secondary research analysis examines the effects of various AI-driven tools on student learning, drawing on literature from 2015 to 2025, including academic articles and institutional reports. Key findings show that AI improves learning experiences by facilitating targeted feedback and deeper comprehension through intelligent tutoring, automated assessments, virtual help, and personalized adaptive learning systems. While accessibility tools support inclusivity for diverse learners, innovative technologies like gamified environments and AR/VR applications encourage student engagement. Early identification of at-risk students, made possible by predictive analytics, enables prompt academic interventions that may increase retention. When it comes to academic performance, students who use AI-supported learning systems generally outperform their peers in traditional classrooms in terms of grades and test scores. Additionally, AI helps teachers by streamlining administrative duties, freeing up more time for mentoring and creative teaching. However, the study draws attention to issues like algorithmic bias, digital inequality, data privacy, and academic dishonesty that are linked to the integration of AI. Teachers' concerns about job displacement and the rapid advancement of technology also highlight the necessity of ethical standards and professional development. The conclusion emphasizes that in order for AI to effectively improve learning, it must be integrated responsibly, requiring the necessary faculty training and digital infrastructure investments. To evaluate the long-term impacts of AI in education, policymakers are urged to create robust ethical frameworks and to conduct longitudinal

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studies. AI has the potential to support more individualized, inclusive, and forward-thinking learning environments in higher education when used appropriately.

Keywords: *Artificial Intelligence, higher education, learning analytics, intelligent tutoring systems, AI academic performance*

1. Introduction

AI refers to the ability of a machine or machine learning system to see, hear, and respond as a human would. In the field of education, AI has made proactive learning possible by developing smart learning environments that can adjust to students' preferences, needs, and learning speed. AI-based observations we learn more and more about how students are learning through data extracted from AI systems, these machines can process large volumes of learner data to ascertain strengths, weaknesses and based recommendations AI-based teaching with data being the new oil and teachers having access to oceans of it from multiple students through AI-driven learning platforms, they get insights into what student's performance looks like. As a result, AI has driven the transformation of personalized and universal design experiences that were previously hard to obtain in classroom settings. Artificial Intelligence (AI) is the imitation of human intelligence by machines; thus, it enables them to think and act like humans. AI aspires to develop machines that can engage in activities that one would characterize as intelligent if they were performed by humans (e.g., visual perception, speech recognition, decision making, learning, or translation) (Fetzer, 1990). John McCarthy, one of the early leaders of AI, defined it as "It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is analogous to the like-minded enterprise of understanding human intelligence with computers, but A.I. has no obligation to restrict itself to biologically observable methods." (McCarthy, 2007). (Kuleto et al., 2021) examines the potential and challenges of deploying AI and ML at HEIs. It features ways that AI and ML can improve teaching and learning, from adaptive learning technology to AI-driven chatbots to automating tasks so that teachers have more time. Fetzer (1990) also explains AI as "the study of how to make machines act intelligently, to solve problems and accomplish objectives in the types of complex worlds where human beings need intelligence to achieve those objectives." In the 21st century, Artificial Intelligence (AI) is becoming one of the most disruptive powers affecting people's lives and work, and education. The development of AI in the education environment has brought new learning,

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teaching, and assessment paradigms to higher educational levels. From intelligent tutoring systems to adaptive learning platforms, and from predictive analytics to automated grading, AI technologies have transformed the way students learn and educators teach. With the rise of the digital age, especially within the higher education sector, where AI is making learning environments more dynamic, efficient, and personalized, it has also transformed how academic achievement and student engagement look.

AI's impact is more profound in higher education, where deep learning and self-learning are paramount. It promotes active learning by providing interactive, fun, and locally meaningful educational resources. Collectively, virtual assistants, ITSs, plagiarism detectors, and learning analytics tools have helped students understand better content material; been motivated by positive or negative reinforcement; or achieve accountability through an academic success stance. Also, AI has simplified the administrative side of the operation of student support services, course management, and evaluation systems, allowing educators to be more pedagogues or mentors. But for all its benefits, AI in higher education comes with a number of challenges.

Ethical considerations such as privacy, algorithmic bias, and technology dependency concern the human aspects of learning. Insufficient access to AI-driven tools and the digital divide can exacerbate disparities between students in heterogeneous socio-economic conditions. In addition, the turn towards AI-led education requires re-skilling of teachers and curriculum reform to ensure that technology supplements rather than takes over the human touch in learning. Thus, it is important to clarify how AI affects learning and academic achievement in order for educators, policymakers, and researchers to better utilize its benefits while reducing its demerits.

This research critically analysed how AI technologies shape higher education through the lens of influencing learning outcomes, fostering individualized instruction, increasing student success, and redefining traditional pedagogy methods. It also discusses the related constraints and ethical issues, offering advice for how institutions might responsibly employ AI to lasting effect on educational innovation.

2. Conceptual Framework

To interrogate AI's impact on learning and academic achievement, it is instructive to examine it from three interconnected perspectives since they each offer complementary views: pedagogical, learner-centric, and systemic-ethical. Such frameworks enable researchers, teachers, and system designers to

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disentangle direct learning from indirect institutional or motivational effects

2.1 Pedagogical Affordances

Pedagogical affordances present how AI contributes to being a beneficial tool in education systems since it enables new instructional possibilities such as scaffolding, formative feedback, and personalization. And this in turn redefines the traditional role of a teacher to that of a facilitator and instructor assisted by AI systems.

2.2 Learner Outcomes

This perspective studies the influence of AI on learners in terms of their four layers of learning: cognitive, metacognitive, affective, and behavioural. Learning improvements manifest as increased comprehension, recall, and problem-solving via adaptive feedback. Metacognitive systems enable thinking back on progress and identifying the things to work on. Engagement and affective tools enhance motivation, confidence, etc. In terms of behaviour, AI assists in monitoring attendance and participation, enabling teachers to promote study habits.

2.3 Systemic and Ethical Context

AI in Education operates within statutory and ethical structures which involves: providing equality of access to technology resources for all students; protecting privacy and ensuring transparency on how data is used by AI tools, along with transparent algorithms governing the decisions taken by AI; preserving academic integrity through mitigating risks such as plagiarism or bias; and ensuring that sufficient infrastructure, policy process management and teacher professional development is available at organizational level to make best use of AI tools.

3. Applications of AI in Higher Education

AI applications in education and higher teaching processes. AI technologies are involved in the higher learning process, supporting activities or tasks. Each has potentially different effects on student learning and attainment. AI has been contributing more and more to education, changing the way students learn, teachers teach, and institutions operate (Loeckx, 2016) This concept of artificial intelligence is of a supercomputer, a computer with huge processing capacity, integrated with the ability for learning (Chen et al., 2020), which goes on to include sensing and other capabilities that

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allow it to function in terms of cognition and functionality analogous to humans, and perhaps even further enhancing interaction between human beings and the supercomputer. Artificial intelligence (AI) has emerged as an agent of change in higher education, impacting instruction, curricula, assessment, and administration. Its uses improve efficiency, customisation, and decision-making, especially in educational institutions aimed at a more learner-centred environment.

3.1 AI in Education and Learning

Disciplinary technology is fundamentally reshaping any kind of teaching practice, with teachers being offered more intelligent systems and tools as well as 'virtual' support that allows to do better education. It provides adaptive learning paths that are tailored to personal pace, knowledge level, and style of individual learners. Systems like Carnegie Learning's MATHia or ALEKS diagnose the misconceptions of students and provide them with focused exercises, allowing for personalized guidance, as that of a human tutor, even in classes with many students. There is also a role for AI to play in the development of white label curriculum and courseware: tools like ChatGPT, Copilot can be used for creating course content, including videos, quizzes, or even populating courses based on learning objectives. These assessments also analyse curriculum and student feedback data in order to identify any gaps and guarantee that everything is in line with the learning objectives, so that educators can save time thanks to improved flexibility of their curriculum. Additionally, digital assistants such as ChatGPT and Google Bard respond to questions and provide explanations, learning tips, and writing help. They also tailor their interactions to students' individual learning histories, both increasing and reducing engagement and cognitive load in complex domains.

3.2 AI for Learning Support

AI enriches learning for students with adaptive, interactive, and data-based methods that encourage self-regulation, motivation, and involvement. Crucial tech components include adaptive learning platforms like Knewton or Smart Sparrow that adjust learning paths according to how a student is performing via machine-learning algorithms. Such systems provide individualized feedback grounded in data analytics, which will help them to realize the faults and track for further progressions well as fill any gaps. Second, AI-backed language learning applications like Duolingo and Babbel, as well as Grammarly, use natural language processing to help users build vocabulary and better master grammar and pronunciation. The key advantage of these tools is that they adjust to the user's ability

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and offer instant negative feedback, which is particularly useful for international students or people learning a foreign language. They mimic conversational practice and written communication correction.

3.3 AI-based Assessment and Evaluation

Efficient, fair, and diagnostic aspects enrich higher education assessment with AI. AI automates marking by featuring scoring algorithms for objective tests and essays, such as the ones provided by learning tools like Gradescope and Turnitin that facilitate grading while detecting potential actions of academic misconduct. In addition, predictive analytics uses past academic data to project student achievement, allowing us to find students who may be struggling early in the process. This forward-leaning posture allows institutions to put interventions like tutoring and personalized support in place, which can drive up retention and completion. Moreover, AI enables real-time evaluation and feedback on digital platforms, which helps respond instantly to student assignments and tests. This ongoing feedback supports learning as students can make timely modifications to their strategies rather than withholding changes until after the assessment.

3.4 Administrative and Management Uses

AI greatly improves in condition, as education is managed by the institution using AI across countless applications. It streamlines administrative processes, particularly the admissions, scheduling advising processes. Within admissions, AI streamlines operations by scrutinizing applicant data to forecast the likelihood of success and rank candidates appropriately. For scheduling, AI automates the generation of timetables, classroom allocations, and faculty loads. In the area of academic advising, AI reviews degree requirements and tracks student progress, suggesting courses that are tailored to help students graduate on time. And the prevention of dropouts owes even more to AI, since dropout models based on attendance, grades, and engagement can track at-risk students. Early warnings can help faculty or counsellors to drive timely interventions, such as advising and other personalized supports that improve student retention, institutional perception, and academic success.

4. Methodology

Titled, “The Influence of Artificial Intelligence on Students’ Learning and Academic Performance in Higher Education,” This current article is a secondary study entirely culled from reputable resources

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like academic journals, articles reported by government and institutions, research papers, online databases, as well as books and credible education websites. Methodology: This is a descriptive analytic study and aims to identify and interpret the available literature on the impact of AI technologies on students' learning process, engagement, accessibility, and academic achievement. Information was collected by reviewing previous studies, policy papers, and statistical publications between 2015 and 2025 to ensure currency and validity. The coded data were then comprehensively analysed to extract significant themes, trends, advantages, and challenges of AI in integrating with HE. Through such second-order data analysis, the author can provide comprehensive findings without engaging first-hand fieldwork, providing the reader with a more holistic picture for understanding how AI has been wielding its power on student learning and achievements.

5. AI's Effects on Learning and Academic Performance

Research evidence suggests that the effect of AI on learning outcomes depends upon technology, settings in which they are used, and how well these systems are integrated with pedagogies. The main results can be summarised as follows:

5.1 Gains from Personalization and Feedback

Finally, personalized learning, which has historically been one of the most potent educational approaches, is now processable at scale through AI. Intelligent tutoring and adaptive systems attempt to replicate the personalized attention of a human tutor. This customization minimizes needless repetition, speeds the learning process, and improves test results. Automated tests provide immediate, targeted feedback that students use to fix mistakes and deepen learning.

5.2 Improved Engagement and Motivation

AI programs might also feature gamified content, personalized learning activities, or interactive interfaces that enhance student engagement. Learners engage more when they have a prompt, help, and acknowledgment from the system. Studies show that more engaged students tend to earn better grades, in part because they study more and persist through challenges.

5.3 Benefits for Complex Skill Development

AI can scaffold high-level cognitive skills such as analytical reasoning or problem-solving by offering a series of structured steps and worked examples. But these gains are contingent on the quality of

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system design. Careless scaffolding can result in rote learning or reliance on AI assistance rather than real conceptual understanding.

5.4 Mixed Results for Writing and Higher-Order Tasks

AI writing tools provide instantaneous feedback on grammar, coherence, and structure through which students can polish their drafts. However, these measures are not as reliable when it comes to measuring creativity, critical thinking, or originality. Overuse of AI in writing could inhibit independent thinking, and therefore should be employed as formative rather than summative tools.

5.5 Predictive Analytics and Student Support

Predictive models surface students with a higher chance of dropout, low performance. And when universities combine these insights with proactive human aid such as tutoring and counselling, the results are improved retention and performance. But AI by itself will not change behaviour; it succeeds only in tandem with human effort and ethical use of data.

5.6 Differential Impacts by Context

The benefits of AI are not equally shared. More advantaged students with consistent internet access, digital literacy, and institutional support benefit more. Alternatively, people without those resources will fall even further behind, leading to even larger educational disparities. Therefore, a fair AI application should include infrastructure, affordability, and inclusion.

6. Influence of AI on Students' Learning and Academic Performance

6.1. Influence of AI on Students' Learning

- a) **Personalized Learning Paths:** Knowing the strengths, weaknesses, and learning pace of each student is what makes personalized education possible using AI. Unlike in the traditional classroom, where all students are subjected to the same curriculum, AI systems tailor lessons and homework assignments to each student's needs. This serves to help students engage more with problematic areas and move on once they have successfully grasped core elements. This encourages students to think more in-depth about concepts while helping them feel confident as they continue their learning.
- b) **Enhanced Engagement:** Artificial Intelligence for learning tools often includes gamification and virtual worlds such as AR (Augmented Reality) and VR (Virtual Reality) to provide more

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interactive education. For example, AI games or simulations could convert complex material into engaging puzzles or virtual experiments. Students are put in the driver's seat not at the back of a bus listening to someone talk, but taking an active role, and it really promotes retention. These deep experiences enable the transfer of theoretical knowledge to learn by practice, e.g., in simulations of simple scientific experiments or accessing historical places using VR, and so increasing the value of learning.

- c) **Improved Accessibility:** Humanity can leverage AI for inclusive education, assisting students with physical and cognitive disabilities as well as those with language barriers. Learning is more accessible with features like text-to-speech, speech recognition, and instant translation. This can allow visually impaired students to hear study materials spoken via AI voice agents, and foreign-language students to receive instant translations. It makes learning democratic so that every student, whatever their home life or their capacities, has equal access to the best education.
- d) **Continuous Feedback:** AI is constantly tracking progress, offering instant feedback rather than waiting for exams. Auto-grading mechanisms and intelligent tutoring systems assess student responses immediately, marking them wrong with suggested corrections. This immediate feedback also allows learners to recognize misunderstandings and correct those before the misconceptions deepen. Additional features include self-regulated learning to help with goal-setting and progress monitoring, promoting students' motivation and academic achievement.

6.2. Influence of AI on Academic Performance

1. Quantitative Impact

a) **Data-driven studies on grade improvements, retention rates, and test performance:** Artificial Intelligence (A.I.) has allowed educators and researchers to capture and process vast amounts of academic data to consider how it affects the knowledge achieved within a learning scenario. Research indicates that adaptive AI learning systems and personalized tutoring programs frequently deliver quantifiable performance gains, including grade point average (GPA) improvements and higher test scores. For example, adaptive platforms that tailor the level of difficulty to how a learner is answering questions lead to more mastery and retention of concepts. Further, in AI, predictive analytics has been associated with increased student retention rates due to vulnerable learners being pinpointed and

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supported on the fly.

b) Traditional vs AI-supported learning outcomes: In the comparison between traditional and AI-based learning, it has been observed that the AI techniques are enabling more personalized as well as effective forms of learning. “Even though we increasingly pay attention to individual learning needs, traditional instruction is a one-size-fits-all proposition; AI tools adjust to the pace of learners, the way they learn, and what they have yet to learn.” Our research suggests that the use of AI-powered systems leads to improved student performance on assessments, as a result of immediate feedback to students and targeted practice. But any such benefits rely on how successfully AI tools are woven into the context of learning and can be guided by educators.

2. Qualitative Impact

a) Student perspectives on AI to understand challenging topics: A common conception amongst students is that AI can act as a supportive friend in understanding complex and abstract things. AI-driven visualizations, simulations, and chat-based tutors help demonstrate subjects that are often easier to teach visually. Students say ChatGPT and similar conversational AI tools offer short, snappy explanations of concepts that help them along in self-guided study. Additionally, asking questions in AI is low-pressure, and that can really increase confidence as well as curiosity. Even so, some students worry about overreliance on A.I., preferring that it augment rather than replace human instruction.

b) Faculty's perceptions of AI as a teaching support system:

Educators increasingly view AI as a useful tool for teaching and student interaction. AI tools can automate part of the administrative tasks, such as grading and attendance, helping teachers to have enough time to focus on mentoring and conceptual teaching. Furthermore, faculty can use analytics dashboards to track the progress of students and make interventions as needed. Still, there are many educators who are highlighting the importance of professional development to be able to effectively leverage AI systems and ethical guidelines that can guard against any misuse or bias in automated feedback and assessments.

3. Predictive Analytics and Academic Success

a) Early identification of at-risk students:

Predictive analytics and the use of AI can highlight students who are potentially not engaging in their

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learning or struggling with their work based on data such as attendance, engagement, and performance statistics. Institutions can intervene in time to avoid failure by noticing early warning signs. For instance, LMS systems featuring AI modules might be able to tag students showing a downward trajectory of engagement for intervention by academic advisors. This early engagement increases student retention and academic success.

b) Intervention models for academic improvement through AI:

AI makes it possible to generate tailored intervention models that can be personalized for every individual student. Smart tutoring systems can suggest specific exercises, further training, or motivational messages in order to overcome difficulties. AI-run mentor bots at some universities lead students through course material to promote better study habits and performance. What such interventions do is to plug learning gaps and ensure that there is continual progress on a longish, cumulative academic journey.

7. Opportunities of AI in Higher Education

- a) **Efficiency and Time Saving:** Automation of repetitive tasks scheduling classes, managing student records, or grading assignments, is perhaps the most significant way Artificial Intelligence increases efficiency in higher learning institutions. This level of automation decreases the burden of tracking for teachers and staff members so they can be more focused on meaningful interactions with students in an academic setting. So now, teachers are free to do what they love; mentoring, offering one-on-one feedback and pioneering teaching ideas which make learning more enjoyable for all of us.
- b) **Data-Driven Decision-Making:** AI-driven analytics allows institutions to make data-informed decisions. Taking into consideration large data sets of student-performance details, attendance trends, and responses, universities can derive correlations and deficits in their teaching styles or programs. These findings can help administrators to enhance course content, develop teaching strategies, and develop pragmatic academic policies. In the end, data-driven decision-making leads to a process of constant improvement in the quality of our institution and the outcomes for our students.
- c) **Skill Development for the Future Workforce:** AI is also being embedded into higher education as a way to prepare students for the expectations of an AI economy. In light of automation and AI revolutions within industries, students need to evolve core competencies

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like AI literacy, data analytics, and digital problem-solving. By incorporating these competencies into their curricula, institutions are helping students develop the technical know-how and flexibility necessary for future jobs in a wide range of industries being transformed by AI innovation.

- d) **Enhancing Research and Innovation:** AI paves the way for research and innovation in higher education. With AI algorithms, researchers can analyse data, recognize patterns, and envisage the future to further speed up the discoveries. Woven into these studies are tools like AI-based simulations to help researchers both to test their hypotheses and visualize vast spaces more efficiently. This technological infrastructure not only boosts research productivity but also fosters interdisciplinary cooperation, which ultimately stimulates scientific development and innovation in all academic domains.

8. Challenges and Ethical Issues

- a) **Privacy and Security of Data:** One of the obvious hurdles to AI adoption in education is to ensure that using AI does not mean loss of privacy and security of data about students. "AI systems are heavily reliant on the collection and analysis of vast amounts of personal and academic data to personalise learning for young people. But this information may be at risk for abuse or unauthorized access, and breaches. Weak Data Protection. Inadequate protection of student data can result in sensitive information becoming public, which could result in the loss of students' trust and raise issues over consent, ownership, and data management ethics.
- b) **Bias and Inequality:** AI algorithms are fair only as long as the data on which they have been trained. If any of the training datasets are biased against certain groups of people, and bias is also present in evaluation metrics or decision thresholds, the AI may produce discriminative results like unfair teaching target numbers or partial feedback. The digital divide also brings inequality: students from underprivileged families might not be using AI tools, reliable internet, or modern devices. This imbalance could actually further, not narrow, the educational divide.
- c) **Academic Integrity:** The ability of AI to generate text, provide solutions, and produce content has some serious implications for academic integrity. AI tools can also be abused by students for plagiarism as well as cheating, which would degrade the integrity of their learning and assessment. Too much dependence on AI-generated responses also has the potential to

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minimize critical thinking, the ability to process data, and form original work, which are necessary for real academic development.

- d) **Over-reliance on AI:** While AI has great potential for automation and personalized learning, we also need it in the infrastructure of children, but not in crucial decision-making. Dependence on tech reduces kids' skills of creative thinking and problem-solving. Since learners can potentially become dependent on AI to instantly solve problems, they may lose the motivation to deep-dive into challenging problems or even work collaboratively with peers. And human contact, a vital part of teaching and learning, can fade away when discussions in the classroom, mentorship, and someone to talk to about emotional problems at school are replaced by AI tools.
- e) **The Role of Teachers and Job Displacement:** As AI begins to play a bigger role in education systems, more people are starting to fear the idea of teachers losing their jobs. When AI systems begin to shoulder responsibilities like grading, lesson planning, and tutoring, educators might feel that they are in the process of being emptied out or even replaced. But instead of replacing teachers, AI should be like any other support it frees up and makes teaching better and more effective, so educators can do what robots can't: mentor, imagine, and offer social-emotional counsel.

9. Future Prospects and Innovations

- a) **Emerging Trends:** Emerging trends, Generative AI and Large Language Models (LLMs) like Generative AI, ChatGPT, Gemini, and Claude are building the Future of College Content. They are transforming higher ed systems from lecture-based to highly personalized tutoring, instant content creation, and real-time feedback. These smart tutors would cater to every child's learning needs and give instant answers or some practice problems. Moreover, the infusion of AI into metaverse learning environments is turning physical classrooms into 3D virtual immersive environments where students interact, collaborate, and experiment in simulated worlds to promote engagement and experience-based education.
- b) **AI Integration with Other Technologies:** The future of higher education will be driven by AI combined with other technologies. When used with IoT, AI can interpret data originating from smart classrooms to improve learning environments. Augmented and Virtual Reality (AR/VR) with AI provide interactive simulations for medicine, engineering architecture.

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Academic Credentials on Blockchain offers an effective way of securing academic credentialing and record keeping through Quantum AI will be relied upon for data analysis in no time. Combined, these integrations will build a smarter, more efficient learning environment.

- c) **Sustainability and Long-term Impact.** AI is also having an impact on the future of lifelong learning and continuing education. Tailored AI-powered platforms can aid learners in all career stages to reskill and upskill based on their job market needs. Institutions also need to take necessary policy actions and strategic measures to prepare themselves for AI, particularly in ethical governance, digital infrastructure, and upskilling faculty. These are the adaptations that will ensure AI is adopted in a way that is sustainable and fair, and helps to achieve educational goals, encouraging innovation while protecting academic integrity and inclusivity.

10. Findings

- AI systems are heavily dependent on the collection and analysis of huge amounts of personal and academic data to provide personalized learning.
- Use of AI can increase efficiency and personalize learning, but overuse can take a toll on creativity and problem-solving skills.
- If students start to depend on AI to provide quick answers, they risk developing a disincentive to really think through difficult problems or work together in the segmented way for which we are talking credit.
- A basic component of education, human interaction can decrease if AI tools are substituting for face-to-face conversations with teachers and emotional support from them.
- AI continues to gain a larger footprint in the education sector, and concerns of teachers being displaced as a result are also rising.
- As artificial intelligence systems are put in charge of grading, lesson planning, and tutoring, educators may feel sidelined as workers or demoralized in their role as teachers.
- But rather than replacing teachers, AI should ideally be used as a cool tool or weapon assist to help optimize teaching efficiency so that teachers can spend more time on mentorship and creativity focus, and various non-machine replicable moral conduct guidance.

11. Recommendations

- Policy makers should promote, develop, and establish holistic AI ethics protocols and data

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privacy protections to safeguard responsible artificial intelligence use in educational settings.

- Policy makers can establish ethical and legal frameworks that create trust with the public, while providing all students with equitable and safe learning environments supported by AI.
- Educational institutions such as colleges and universities need to develop a strong digital infrastructure to facilitate the deployment of AI tools in classrooms and administrative functions.
- Internet connection, secure data systems, and current software. Such as teacher training systems should be improved to assist teachers in the effective use of AI technologies for teaching and assessing.
- It is necessary for both teachers and students to take a critical stance on the use of AI tools. Teachers should lead students on the ethical use of AI and help them support its limitations and independent thinking.
- Longitudinal studies should be carried out to investigate the long-term cognitive, academic, and psychological impact of AI on learners and educators.
- AI impacts motivation, critical thinking, and learning outcomes over a period of time. Evidence-based research will assist in guiding policy and teaching practice to ensure AI in education is used in a way that is beneficial, ethical, and sustainable.

Conclusion

The use of artificial intelligence (AI) in higher education has revolutionized teaching methods by boosting academic achievement and individualized learning. Adaptive learning pathways, real-time feedback, intelligent tutoring systems, and advanced analytics are examples of AI tools that enhance teaching and learning outcomes, as demonstrated by the analysis of secondary data. AI in particular improves student accessibility, engagement, and personalization by allowing them to go at their own speed and get immediate feedback. Immersion technologies, such as AR/VR simulations driven by AI, encourage active learning. Through text-to-speech and translation tools, AI also helps students who struggle with language and disabilities. AI, therefore, encourages engagement and motivation, which are essential for academic success. Predictive analytics aids in identifying students who are at risk so that prompt intervention can take place, and evidence suggests that successful AI integration improves test scores and retention rates. Additionally, AI allows teachers to use big datasets for decision-making and expedite administrative tasks, freeing up more time for mentoring and innovative

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instruction. However, the study highlights the need for ethical frameworks and continuous teacher training by acknowledging the operational and ethical issues associated with AI use, such as worries about algorithmic bias, data privacy, and the possible decline in human interactions. Depending on strong regulations and inclusive practices, emerging AI trends like generative AI, metaverse learning environments, and integration with IoT and blockchain could further transform education in the future. In conclusion, when used responsibly and cooperatively, AI's transformative potential in higher education can be successfully realized, guaranteeing that intelligent technologies enhance human-centred learning.

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