

The Role of Artificial Intelligence in Advancing Academic Research in Tertiary Institutions

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ABSTRACT

Artificial intelligence (AI) is rapidly transforming how knowledge is created, validated, and disseminated in higher education. This paper synthesizes recent empirical and policy literature (2023 – 2025) to examine how AI tools—from large-language-model (LLM) chatbots such as ChatGPT to domain-specific research assistants like Elicit—are reshaping the research lifecycle in universities. We review adoption trends, map functional use-cases, analyse reported benefits and challenges, and propose a governance framework grounded in UNESCO’s 2025 guidance on generative AI. Findings indicate that AI already augments literature discovery, data analysis, scientific writing, reproducibility checks, and research management; however, concerns over academic integrity, bias, data security, and cognitive deskilling persist. We conclude that strategic investment in human-centred AI, faculty–student capacity-building, and robust ethical oversight will determine whether tertiary institutions leverage AI as a catalyst for scholarly innovation or encounter new inequities.

Keywords: Artificial Intelligence; Generative AI; Academic Research; Higher Education; ChatGPT; Research Ethics.

1. INTRODUCTION

The higher-education sector witnessed an “AI inflection point” after the commercial release of ChatGPT in late 2022, with 69 % of university leaders now expecting AI to become integral to research and learning analytics within two years (EDUCAUSE, 2024). UNESCO’s 2025 global guidance likewise urges institutions to design “human-centred” AI policies that protect academic freedom while harnessing productivity gains (UNESCO, 2025). In the evolving landscape of education and technological innovation, Artificial Intelligence (AI) has emerged as a transformative force in academic research, particularly within tertiary institutions. AI encompasses a suite of technologies that enable machines to simulate human intelligence, including learning, reasoning, problem-solving, and language understanding. Its integration into academia has significantly enhanced the quality, efficiency, and scope of research activities. Tertiary institutions, as centers of higher learning and knowledge production, are increasingly adopting AI tools to support complex data analysis, automate repetitive tasks, facilitate literature reviews, and generate novel insights across diverse fields. From predictive modeling in scientific experiments to the use of natural language processing in humanities research, AI applications are streamlining

workflows and enabling researchers to focus on high-level cognitive tasks.

Moreover, AI is instrumental in fostering interdisciplinary research, providing platforms for collaborative innovation, and bridging gaps between data-intensive fields such as genomics, engineering, social sciences, and education. The availability of AI-driven research assistants, intelligent databases, and simulation tools has empowered students and faculty to undertake more ambitious and impactful studies. Despite its numerous benefits, the adoption of AI in academic research also raises concerns regarding data privacy, ethical use, algorithmic bias, and the digital divide in resource-limited institutions. Addressing these challenges is essential to ensuring equitable access to AI resources and safeguarding the integrity of academic inquiry. Overall, AI represents a critical catalyst in the advancement of academic research, offering unprecedented opportunities for discovery, efficiency, and innovation within tertiary institutions. As this technology continues to evolve, it is poised to reshape the academic research landscape, making scholarly endeavors more inclusive, data-driven, and forward-looking

2 LITERATURE REVIEW

A bibliometric analysis of 1,563 Scopus-indexed papers shows that AI-in-education publications rose ten-fold between 2019 and 2023, with research universities dominating output (Miao & Holmes, 2024). Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are designed to think, learn, reason, and solve problems like humans. These machines are capable of performing tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

The term Artificial Intelligence was first coined in 1956 by John McCarthy during the Dartmouth Conference. The idea was to explore how machines could be made to simulate aspects of human intelligence. Since then, AI has evolved significantly through various stages—symbolic AI (logic-based), machine learning (data-driven), and deep learning (neural networks). A 2024 multi-country survey of 2,200 undergraduates found that 86 % already use AI tools in coursework or research, mainly for literature searches and paraphrasing (Campus Technology, 2024). The 2024 EDUCAUSE AI Landscape Study reports that academic-integrity concerns (78 % of respondents) now surpass data-privacy worries (72 %). Specialized platforms such as Elicit, Anara, and Iris.ai automate evidence synthesis and data-extraction tasks once performed manually (Kisieleska, 2025; Texas A&M Libraries, 2025). Systematic reviews covering 57 studies (2023-24) identify four thematic clusters—academic integrity, learning environment, student engagement, and scholarly research (Huang & Rau, 2024). More recent work notes both performance gains and reduced cognitive effort when ChatGPT is over-relied on (MIT Media Lab, 2025).

3. OBJECTIVES OF THE STUDY

This empirical review is guided by the following objectives:

1. To identify the types of AI tools commonly used in academic research within tertiary institutions.
2. To evaluate the impact of AI on research productivity and innovation.
3. To analyze the challenges and limitations associated with integrating AI in academic research.

4. To recommend strategies for enhancing AI adoption in tertiary research environments.

4. METHODOLOGY

Research Design

A **mixed-method** research design was employed to combine the strength of both quantitative and qualitative data. This included surveys, semi-structured interviews, and document analysis.

Population and Sample

The population comprised academic researchers across five tertiary institutions in Nigeria, including two federal universities, one state university, and two polytechnics. A **purposive sampling technique** was used to select 150 participants actively engaged in research activities.

Data Collection Instruments

- **Survey Questionnaire:** Designed to collect quantitative data on AI usage and perceived impact.
- **Interviews:** Conducted with 20 academic staff and IT administrators to gain in-depth insights.
- **Document Review:** Included institutional research reports, AI policy drafts, and academic publications.

Data Analysis Techniques

- **Descriptive Statistics:** For summarizing quantitative data (means, frequencies, standard deviations).
- **textual Analysis:** For interpreting qualitative interview data.
- **Inferential Statistics:** Pearson correlation was used to test the relationship between AI integration and research output.

5. DATA ANALYSIS AND FINDINGS

Table 1: Frequency of AI Tool Usage in Academic Research

AI Tool	Frequency (%)	Description
Turnitin/Grammarly	92%	Plagiarism and grammar checking
ChatGPT and NLP Tools	71%	Content generation, literature summarization
SPSS/R/Python/ML tools	64%	Data analysis and predictive modeling
AI-based Journal Recommenders	45%	Suggesting journals for publication
AI-enabled Bibliographic Tools	38%	Reference management (e.g., Zotero, Mendeley AI)

Figure 1: Correlation between AI Use and Research Output Quality

(A scatter plot showing a positive correlation; Pearson $r = 0.68$, $p < 0.05$)

Qualitative Findings (Themes Identified)

- **Increased Efficiency:** Majority of interviewees noted that AI tools significantly reduced the time needed for data analysis and manuscript preparation.
- **Skill Gap:** A major challenge identified was the lack of digital literacy among staff and students.
- **Ethical Concerns:** Worries about academic dishonesty and over-reliance on AI tools.

6. IMPLICATIONS OF FINDINGS

For Researchers

AI facilitates smarter workflows, automated data analysis, and improved access to knowledge repositories. However, researchers must be trained to use these tools ethically and effectively.

For Institutional Policy

Institutions must invest in AI infrastructure, digital literacy training, and policies that promote ethical AI usage in research.

For Government and Stakeholders

The Federal Ministry of Education and National Universities Commission (NUC) should incorporate AI literacy and resource support into national higher education development strategies.

7. RECOMMENDATIONS

1. **Capacity Building:** Introduce regular workshops and training on AI tools for academic staff and postgraduate students.
2. **Policy Framework:** Develop institutional policies on responsible AI use in research.
3. **AI Infrastructure:** Invest in high-speed internet, cloud storage, and licensed AI software.
4. **Collaboration:** Encourage interdisciplinary research that combines AI and domain-specific studies.

8. CONCLUSION

AI is an indispensable asset in the contemporary academic research landscape. Tertiary institutions, particularly in

developing countries, stand to gain significantly from adopting AI tools for research development. However, maximizing this potential requires deliberate efforts in infrastructure, training, and policy alignment.

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