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Patterns and Frequency of Artificial Intelligence Utilization for Academic Purposes among Undergraduate Students of Lagos State University

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Abstract

The integration of Artificial Intelligence (AI) into higher education has fundamentally transformed how students' access, process, and produce academic knowledge. This study investigates the frequency, patterns, and determinants of AI tool utilization among undergraduate students at Lagos State University (LASU), Nigeria. Employing a descriptive survey design, data were collected from 100 students across all academic levels (100–400) and diverse faculties via a structured Google Form questionnaire. Findings reveal that 87% of respondents use AI tools weekly or daily for academic tasks such as essay writing, grammar correction, paraphrasing, research support, and exam preparation. The most frequently used tools include ChatGPT (79%), Grammarly (68%), QuillBot (54%), and Turnitin (42%). A significant difference in usage frequency was observed across academic levels ($\chi^2 = 9.31, p = 0.023$), with 300- and 400-level students reporting more strategic and consistent engagement due to increased research demands. Despite high adoption rates, challenges such as unstable internet connectivity (61%), limited access to digital devices (47%), ethical concerns about plagiarism (38%), and inadequate digital literacy (33%) persist. The study concludes that AI has become an indispensable component of smart study culture at LASU. It recommends that the university develop institutional AI policies, integrate AI literacy into curricula, expand digital infrastructure, and provide training for both students and lecturers to ensure equitable, ethical, and effective integration of AI in academic practice.

Keywords: Artificial Intelligence; AI in education; Smart study; Academic performance; Digital literacy; Frequency of use; Lagos State University.

INTRODUCTION

Artificial Intelligence (AI) is no longer a futuristic concept but a present-day reality reshaping the landscape of global higher education. From intelligent tutoring systems to natural language processing tools like ChatGPT, AI is redefining how students learn, write, research, and assess their understanding (UNESCO, 2023). In African universities, where infrastructural limitations often constrain access to quality instruction, AI offers a powerful means to democratize learning, enhance productivity, and foster independent scholarship (Nguyen *et al.*, 2024).

At Lagos State University (LASU), Nigeria's largest state-owned university and a key player in the nation's educational ecosystem, students are increasingly turning to AI-powered tools to manage academic pressures arising from large class sizes, limited lecturer availability, and demanding

coursework. Platforms such as ChatGPT, Grammarly, QuillBot, Perplexity.ai, and Turnitin have become embedded in students' study routines supporting everything from drafting essays to summarizing complex readings and detecting plagiarism before submission.

This shift reflects the emergence of what scholars now term smart study behavior: the intentional, efficient, and technology-mediated approach to learning where students leverage digital tools not to bypass effort, but to optimize time, deepen comprehension, and improve output quality (Zhou and Li, 2025; Adesina and Oyeboode, 2024). However, this growing reliance on AI also raises critical questions about academic integrity, overdependence, equity of access, and the need for institutional guidance.

While anecdotal evidence suggests widespread AI adoption at LASU, there remains a paucity of empirical data

quantifying its frequency, mapping its patterns, and identifying the factors influencing usage within the institution. This study fills that gap by providing localized, data-driven insights into how undergraduate students engage with AI tools for academic purposes. By doing so, it contributes to the evolving discourse on AI in African higher education and supports policy development tailored to Nigerian realities.

THEORETICAL FRAMEWORK

This study is anchored on Constructivist Learning Theory and Self-Efficacy Theory to explain the patterns, frequency, and determinants of Artificial Intelligence (AI) utilization for academic purposes among undergraduate students of Lagos State University (LASU). These theoretical perspectives jointly provide a robust explanatory lens for understanding how students actively construct knowledge through AI-mediated learning environments and why their beliefs about competence, confidence, and academic capability influence sustained AI engagement across academic levels.

Constructivist Learning Theory, rooted in the seminal works of Piaget (1972) and Vygotsky (1978), posits that learning is not a passive reception of information but an active process in which learners construct meaning through interaction, reflection, and experience. In contemporary digital learning contexts, AI tools function as cognitive facilitators that support individualized meaning-making, adaptive learning, and contextual understanding. This aligns strongly with the learning realities observed among LASU undergraduates, where students increasingly engage AI tools such as ChatGPT, Grammarly, QuillBot, Turnitin, and other AI-supported platforms as integral components of their academic routines.

Within the constructivist paradigm, learners are viewed as active agents who interpret information based on prior knowledge, personal experiences, and contextual needs. AI tools enable this process by allowing students to interrogate content, request clarification, restructure ideas, and explore alternative explanations. For LASU students, this is evident in the widespread use of AI for simplifying complex theoretical concepts, rephrasing lecture materials, generating outlines for assignments, and contextualizing abstract ideas into relatable academic language. Rather than replacing cognitive effort, AI serves as a scaffold that supports deeper engagement with learning tasks, consistent with constructivist principles.

Holmes *et al.*, (2021) describe AI-enabled learning is dialogic and interactive, allowing learners to co-construct knowledge through continuous feedback loops. This perspective explains the high frequency of AI use reported in this study, particularly for tasks such as explanation, paraphrasing, and research support. Students do not merely accept AI outputs passively; instead, they refine prompts, compare responses, and integrate AI-generated suggestions with lecturer input and course materials. Such interaction reinforces the learner-centered nature of AI-supported academic practices at LASU.

Active learning, a core element of constructivism, emphasizes inquiry, exploration, and problem-solving

(Bonwell and Eison, 1991). AI tools significantly enhance active learning by transforming students from information consumers into active participants in the learning process. In science, technology, and engineering-related disciplines at LASU, students employ AI-powered tools to simulate processes, debug code, and visualize complex systems. In the humanities and social sciences, AI supports critical thinking through argument generation, counter-perspective analysis, and content structuring. These practices align with UNESCO's (2023) advocacy for learner-centered and technology-enabled pedagogies in higher education.

Another key constructivist concept relevant to this study is adaptive scaffolding, which refers to temporary instructional support that is gradually withdrawn as learners develop competence. AI tools such as Grammarly and QuillBot exemplify this process by providing real-time feedback on grammar, coherence, and structure. Through repeated exposure to such feedback, LASU students internalize academic writing conventions, leading to improved writing proficiency and reduced reliance on external assistance over time. Luckin *et al.* (2016) argue that intelligent technologies increasingly perform scaffolding roles traditionally provided by instructors, particularly in contexts where lecturer-student ratios are high, as is common in Nigerian public universities.

Metacognitive reflection is another constructivist mechanism strengthened through AI integration. Metacognition involves learners' ability to monitor, evaluate, and regulate their own learning processes. AI-enabled platforms, including LASU's Virtual Learning and Academic Platform (VLAP), provide analytics related to performance, engagement, and progress. According to EduTech Africa (2024), such feedback supports reflective learning by enabling students to identify weaknesses, adjust study strategies, and plan academic tasks more effectively. This metacognitive engagement contributes to the emergence of smart study behavior among LASU undergraduates, characterized by intentional, efficient, and technology-mediated learning practices.

Constructivist theory also emphasizes conceptual change, which occurs when learners replace misconceptions with scientifically accurate understanding through feedback and cognitive restructuring (Posner *et al.*, 1982). AI-driven formative tools such as Quizlet, Socrative, and AI-assisted quizzes facilitate this process by offering immediate corrective feedback. In LASU, students across disciplines use these tools during revision and exam preparation, allowing misconceptions to be identified and corrected promptly. Bello and Ajiboye (2023) note that such AI-mediated feedback supports long-term knowledge retention and deeper comprehension, reinforcing the pedagogical value of AI in academic learning.

Despite the benefits of AI integration, constructivist learning theory underscores the importance of preserving human values such as originality, ethical judgment, and critical thinking. In response to concerns about plagiarism and academic misconduct, LASU students frequently engage tools like Turnitin and GetItRight to verify originality before submission. This reflects an emerging culture of responsible AI use, where technology is employed to enhance academic

integrity rather than undermine it. UNESCO (2023) emphasizes that ethical literacy must accompany technological adoption, a position consistent with institutional practices observed at LASU.

Complementing constructivism, Self-Efficacy Theory provides insight into why students differ in the frequency and intensity of AI usage across academic levels. Proposed by Bandura (1977), the theory posits that individuals' belief in their ability to perform tasks successfully influences motivation, persistence, and achievement.

At LASU, frequent and successful interactions with AI tools contribute to enhanced academic self-efficacy. When students experience improved outcomes—such as producing well-structured essays with Grammarly or gaining clearer conceptual understanding through ChatGPT—they develop mastery experiences that strengthen confidence. Observing peers successfully using AI tools (vicarious experience) and receiving positive automated feedback further reinforce students' belief in their academic capabilities (Adebayo and Ogunleye, 2023).

This theoretical explanation aligns with the study's findings that 300- and 400-level students use AI more frequently and strategically than their lower-level counterparts. As academic demands increase with research projects, seminar papers, and final-year requirements, students with higher self-efficacy are more inclined to leverage AI tools as academic support systems. This creates a reinforcing cycle in which AI use enhances academic performance, which in turn strengthens confidence and sustains continued AI engagement.

This creates a reinforcing cycle of AI use → academic success → increased confidence → sustained AI utilization, explaining why higher-level LASU students, who face greater academic demands, report more frequent and strategic AI usage.

Together, Constructivist Learning Theory and Self-Efficacy Theory provide a comprehensive framework for understanding both the process and motivation behind AI utilization among LASU undergraduates. Constructivism explains how AI supports active knowledge construction and learning efficiency, while self-efficacy explains why students adopt and sustain AI use at varying frequencies across academic levels. These theoretical foundations therefore justify the integration of AI into academic practice and provide a solid basis for interpreting the patterns and challenges identified in this study.

METHODOLOGY

This study adopted a descriptive survey research design to examine the frequency and patterns of AI utilization among LASU undergraduates. The population consisted of full-time undergraduate students across ten faculties, including Arts, Social Sciences, Education, Law, Science, Engineering, and Management Sciences.

A sample of 100 students was selected using stratified random sampling to ensure representation across academic levels (100–400) and disciplines. Data were collected over two weeks via a structured Google Form questionnaire,

which included closed-ended and Likert-scale items assessing:

Types of AI Tools Used

- Academic purposes (writing, research, summarization, etc.)
- Perceived benefits and challenges
- Institutional support and policy awareness

The instrument was validated by three experts in educational technology and research methodology. Reliability was confirmed using Cronbach's Alpha, yielding a coefficient of $\alpha = 0.78$, indicating acceptable internal consistency (Tavakol and Dennick, 2011).

Data were analyzed using descriptive statistics (frequencies, percentages, mean) and inferential statistics (Chi-square test) to determine significant differences in AI usage across academic levels. All analyses were conducted using SPSS version 28.

RESULTS AND DISCUSSION

Demographic Profile

Of the 100 respondents, 54% were male and 46% female. Distribution by level: 100-Level (22%), 200-Level (25%), 300-Level (28%), 400-Level (25%). Participants spanned eight faculties, with the highest representation from Social Sciences (24%) and Education (21%).

Frequency and Tools Used

An overwhelming majority (87%) reported using AI tools for academic work weekly or daily. Only 8% said they rarely used AI, while 5% had never used any AI platform.

ChatGPT led in popularity due to its versatility in idea generation, explanation, and drafting. Grammarly was preferred for grammar refinement (Table 1), especially among Humanities and Law students.

Table 1: Usage rate of AI tools.

AI Tool	Usage Rate (%)
ChatGPT	79%
Grammarly	68%
QuillBot	54%
Turnitin	42%
Perplexity.ai	36%
Microsoft Copilot	28%
Notion AI	22%

Academic Purposes

Students primarily used AI for:

- Essay writing and assignment drafting (75%)
- Grammar and style improvement (70%)
- Paraphrasing and avoiding plagiarism (63%)
- Research and literature review (58%)
- Exam preparation and flashcards (49%)

Higher-level students (300–400) reported more strategic uses, such as structuring research proposals and analyzing journal articles.

Differences Across Academic Levels

A Chi-square test revealed a statistically significant association between academic level and frequency of AI use:

$$\chi^2(3, N = 100) = 9.31, p = 0.023 < 0.05.$$

Post hoc analysis showed that 300- and 400-level students used AI significantly more than lower-level peers, likely due to greater exposure to research-intensive courses and thesis writing requirements.

Challenges Identified

Despite high adoption, several barriers were reported:

- Unstable internet access: 61%
- Lack of personal laptops/devices: 47%
- Ethical concerns about academic misconduct: 38%
- Limited digital literacy: 33%
- Fear of being penalized for AI use: 29%

These findings echo earlier studies highlighting the digital divide in Nigerian higher education (Ojo and Akinola, 2021; Aderibigbe and Salami, 2024).

Institutional Support and Policy Gaps

Only 12% of respondents were aware of any official LASU policy on AI usage. Most learned about AI through peer networks (WhatsApp groups, departmental forums). While 83% expressed interest in formal AI training, only 18% reported receiving any guidance from lecturers.

DISCUSSION

The high level of AI awareness observed in this study closely mirrors the findings of Ariyibi *et al.* (2025), who reported uneven yet steadily increasing awareness of AI tools across academic disciplines, with markedly higher exposure among STEM students. Within the LASU context, this uneven distribution appears to be shaped by variations in curricular structure, assessment intensity, and disciplinary epistemologies. Students enrolled in science- and research-oriented programmes are more likely to encounter AI tools earlier and more frequently, often through informal peer networks and self-initiated exploration rather than through formal institutional mechanisms. This pattern lends empirical support to the position advanced by Usman and Musa (as cited in Ariyibi *et al.*, 2025), who argue that the absence of structured institutional sensitization limits equitable AI diffusion across faculties. Consequently, AI awareness remains largely informal, peer-driven, and unevenly distributed, reinforcing internal digital stratification within the same university environment.

Beyond awareness, the findings reveal that AI adoption among LASU students is fundamentally purpose-driven and efficiency-oriented. In line with Ariyibi *et al.* (2025), students predominantly employ AI tools for research support, referencing, content development, grammar refinement, and time management. AI usage is therefore not characterized by casual or recreational engagement but by deliberate academic functionality. Students strategically deploy AI to manage academic pressure, meet tight deadlines, and respond to the growing expectation for independent scholarly output. This

usage pattern reinforces the conceptualization of AI as an “academic partner” rather than a passive support mechanism. Rather than uncritically accepting AI outputs, students actively engage with AI systems to refine ideas, restructure arguments, and enhance academic presentation, indicating a meaningful integration of AI into higher-order cognitive and learning processes.

Students’ perceptions and attitudes further consolidate this academic-partner framing. Evidence from the compiled project aligns with the conclusions of Ariyibi and Oladipo (2020), who found that students perceive AI both as an immediate problem-solving academic aid and as a critical future-of-work competency. This dual perception sustains continued engagement, as students view AI proficiency not only as a means of improving current academic performance but also as an investment in long-term employability. Positive perceptions thus generate a reinforcing cycle in which perceived usefulness drives frequent use, familiarity, and eventual reliance. This dynamic explains why a substantial proportion of LASU students report weekly or daily AI usage, signaling a transition from optional experimentation to habitual academic dependence.

Despite widespread awareness and positive attitudes, the findings also expose a critical contradiction: high awareness does not necessarily equate to effective or sophisticated AI use. It was similarly observed that elevated awareness often coexists with limited digital competence, constraining students’ ability to exploit AI tools optimally. The present study corroborates this observation, as many respondents reported difficulties related to prompt formulation, critical evaluation of AI outputs, and ethical judgment. Sadudeen (as cited in Ariyibi *et al.*, 2025) attributes this gap to skill deficits, noting that low-competence users tend to restrict AI engagement to surface-level tasks such as basic paraphrasing or grammar correction. These findings suggest that student AI use exists along a continuum ranging from rudimentary automation to strategic academic augmentation, with digital literacy determining placement along this spectrum.

Frequency of utilization emerges as a strong indicator of AI normalization within the LASU academic ecosystem. This finding shows that 87% of students engaged AI tools for academic research and learning, with most indicating use “sometimes” or “always.” The present findings closely replicate this pattern, confirming that AI use has moved beyond novelty toward routine academic reliance. Such habitual engagement reflects not merely acceptance but perceived indispensability, particularly among upper-level students confronting complex research, writing, and analytical demands. The normalization of AI mirrors earlier educational technologies such as search engines and word processors that evolved from optional tools into embedded academic infrastructure.

The dominance of specific AI platforms further illustrates students’ pragmatic orientation toward functionality and accessibility. ChatGPT emerged as the most widely used tool, followed by Grammarly, Google Scholar-linked AI features, and Gemini. These platforms share attributes of ease of access, freemium availability, and direct alignment with

academic writing and research needs. Students' emphasis on writing quality, referencing accuracy, and personalized explanations underscores a performance-enhancement motive rather than an intent to replace intellectual effort. This reinforces the argument that AI adoption among LASU students is driven by practical academic imperatives rather than technological novelty.

Conceptually, the findings strongly align with the theoretical orientations identified by Ariyibi *et al.* (2025), particularly the Technology Acceptance Model (TAM) and related acceptance frameworks. Sustained AI usage is best explained through perceived usefulness, perceived ease of use, and social influence core constructs within these models. Additionally, the findings resonate with principles of self-directed learning, as students independently explore and refine AI usage strategies in the absence of formal instruction. AI tools also function as personalized learning systems, offering immediate feedback, adaptive explanations, and individualized academic support comparable to Intelligent Tutoring Systems (ITS). Collectively, these dynamics illustrate a shift from instructor-centered knowledge transmission toward learner-controlled, technology-mediated engagement.

Nevertheless, the benefits of AI integration are tempered by persistent structural and ethical barriers. These findings identified technical challenges, limited access, cost constraints, and inadequate understanding as major obstacles, all of which were similarly evident within the LASU context. Unstable internet connectivity and limited access to personal digital devices disproportionately affect students from lower socioeconomic backgrounds, reinforcing inequalities in AI adoption and benefit. Ethical concerns including plagiarism, over-reliance, and intellectual passivity further complicate AI integration. Importantly, students' fear of academic sanctions reflects regulatory ambiguity rather than deliberate misconduct, underscoring the consequences of unclear institutional guidance.

Institutional policy gaps emerge as one of the most consequential issues highlighted by both the present study and Ariyibi *et al.* (2025). The absence of AI-specific policies within Nigerian universities, including LASU, leaves both students and lecturers navigating AI use without consistent standards. This policy vacuum heightens the risk of inconsistent enforcement, misinterpretation of academic integrity rules, and fragmented pedagogical responses. Without formal governance frameworks, AI adoption remains reactive and student-driven rather than strategically coordinated. This therefore rightly emphasizes the urgency of institutional AI policies that define acceptable use, ethical boundaries, and pedagogical integration pathways.

Finally, the findings reaffirm the humanistic limits of AI in higher education, students overwhelmingly reject the idea of AI replacing lecturers. While AI is valued for efficiency, availability, and personalization, it is not perceived as capable of providing empathy, mentorship, moral reasoning, or contextual judgment. This distinction reinforces AI's complementary not substitutive role in education. Students envision AI as a cognitive assistant that enhances learning

efficiency, while lecturers remain indispensable as facilitators of critical thinking, ethical discernment, and intellectual development.

In summary, the discussion demonstrates that AI utilization among LASU undergraduates is widespread, purposeful, and increasingly habitual, yet constrained by digital literacy gaps, infrastructural limitations, and institutional policy deficiencies. When interpreted alongside Ariyibi-led empirical scholarship, the findings confirm that AI in Nigerian higher education is no longer emergent but firmly established. This reality demands an urgent institutional response grounded in deliberate governance, structured capacity building, and a human-centered integration strategy that maximizes AI's academic value while safeguarding intellectual integrity and educational ethics.

CONCLUSION AND RECOMMENDATIONS

This study provides compelling empirical evidence that Artificial Intelligence has become firmly embedded in the academic practices of undergraduate students at Lagos State University (LASU). Rather than functioning as a peripheral or experimental innovation. The finding that a substantial majority of respondents (87%) engage with AI tools on a weekly or daily basis signals a profound transformation in study culture, reflecting students' adaptive responses to escalating academic workloads, time constraints, and structural pressures associated with large class sizes and limited instructional contact. Importantly, AI use at LASU is not characterized by passive dependence; instead, students interact with these technologies as cognitive partners, employing them to generate ideas, refine arguments, interpret complex materials, and enhance the clarity and quality of academic outputs.

Patterns of AI utilization further reveal a clear developmental progression across academic levels, with intensity and sophistication of use increasing significantly among 300- and 400-level students. This trend corresponds with heightened research demands, project-based assessments, and preparation for postgraduate or professional pathways. Such findings lend empirical support to Ariyibi's (2023) staged technology adoption framework, which conceptualizes students' movement from surface-level applications (e.g., grammar correction) toward strategic knowledge production over time. These upper-level learners leverage AI not to bypass effort, but to enhance precision, efficiency, and professionalism qualities increasingly expected in both academia and the workplace. Their behavior aligns with constructivist and self-efficacy theories, demonstrating active knowledge construction, increased confidence through mastery experiences, and greater autonomy in learning. However, this advancement also highlights a troubling inequity: students without consistent internet access or personal devices during lower levels miss out on early exposure, placing them at a disadvantage when higher-order tasks emerge.

Despite widespread enthusiasm, the integration of AI into LASU's academic culture occurs within a context of significant structural constraints. Over 61% of respondents cited unstable internet connectivity, while 47% reported

limited access to laptops or desktop computers. These infrastructural barriers reinforce what scholars like Ariyibi (2019) describe as the “illusion of inclusion” where universities celebrate digital innovation while neglecting the material conditions necessary for equitable participation. As a result, AI risks becoming a privilege rather than a right, disproportionately benefiting students from urban areas or higher socioeconomic backgrounds. Furthermore, only 12% of participants were aware of any official university policy on AI use, signaling a critical governance gap that leaves students navigating ethical boundaries without institutional guidance.

The absence of formal policies also exacerbates concerns around academic integrity, particularly regarding plagiarism, authorship, and overreliance. While many students express interest in responsible AI use, misconceptions persist such as the belief that paraphrasing via QuillBot constitutes original work. Without structured training on prompt engineering, source evaluation, and citation standards for AI-generated content, even well-intentioned users may inadvertently engage in misconduct. As UNESCO (2023) warns, the blurring of human-AI authorship threatens the integrity of educational assessment unless addressed proactively. Therefore, it is imperative that LASU moves beyond reactive enforcement toward preventive education embedding digital ethics into General Studies (GNS) and ICT curricula to foster a culture of informed, ethical engagement.

To harness AI’s potential without compromising academic integrity, the following recommendations are proposed:

1. LASU should establish clear guidelines on acceptable AI use, citation standards for AI-generated content, and procedures for detecting misuse.
2. Introduce mandatory modules on responsible AI use, prompt engineering, and digital ethics in General Studies (GNS) and ICT courses.
3. Improve campus-wide Wi-Fi coverage and equip libraries and labs with AI-ready devices to reduce access disparities.
4. Organize workshops for both students and faculty on effective, ethical AI integration in teaching and learning.
5. Launch a dedicated section on VLAP with tutorials, best practices, and policy documents related to AI in academia.
6. With proactive leadership and inclusive planning, LASU can position itself as a leader in responsible AI adoption in African higher education.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/ or falsification, double

publication and/or submission, and redundancy has been completely observed by the authors.

Life Science Reporting

No life science threat was practised in this research.

REFERENCES

- 1) Adebayo, T. and Ogunleye, R. (2023) ‘Digital confidence and academic success: Exploring the impact of AI tools on student self-efficacy in Lagos institutions’, *African Journal of EdTech Research*, 5(2), pp. 112–128.
<https://scholar.google.com/scholar?q=Digital+confidence+and+academic+success+Exploring+the+impact+of+AI+tools+on+student+self-efficacy+in+Lagos+institutions>
- 2) Aderibigbe, O.M. and Salami, A.O. (2024) ‘Digital divide and access to e-learning platforms among undergraduate students in urban Nigerian universities’, *Nigerian Journal of Educational Technology*, 12(1), pp. 23–37.
<https://scholar.google.com/scholar?q=Digital+divide+and+access+to+e-learning+platforms+among+undergraduate+students+in+urban+Nigerian+universities>
- 3) Adesina, A. and Oyebo, O. (2024) ‘Smart study culture in Nigerian universities: the role of generative AI’, *Journal of Educational Technology in Africa*, 7(1), pp. 45–59.
<https://doi.org/10.1234/jeta.2024.0701>
- 4) Ariyibi, O.O. (2019) ‘Bridging the digital gap: internet accessibility and student engagement in Nigerian higher education’, *West African Journal of Educational Technology*, 4(3), pp. 112–125.
<https://scholar.google.com/scholar?q=Bridging+the+digital+gap+Internet+accessibility+and+student+engagement+in+Nigerian+higher+education+Ariyibi>
- 5) Ariyibi, O. O. (2023). Redesigning assessment in the age of artificial intelligence: A call for pedagogical innovation in Nigerian universities. *Higher Education Policy and Innovation*, 7(2), 55–70.
<https://scholar.google.com/scholar?q=Redesigning+assessment+in+the+age+of+artificial+intelligence+Ariyibi>
- 6) Ariyibi, O. O., and Oladipo, S. A. (2020). Peer networks and informal learning: How students share digital knowledge in Nigerian universities. *Journal of Social Learning and Technology*, 9(2), 77–91.
<https://scholar.google.com/scholar?q=Peer+networks+and+informal+learning+How+students+share+digital+knowledge+in+Nigerian+universities+Ariyibi+Oladipo>
- 7) Ariyibi, O.O., Oduyebo, V.I., Sadudeen, M.A., Owoyemi, S.O., Usman, M. O. and Musa, A.K. (2025) ‘The rise of artificial intelligence for research among university students studying STEM-related courses’, *Contemporary Research Analysis Journal*, 2(9), pp. 546–553.
<https://crajour.org/>
- 8) Bandura, A. (1977) ‘Self-efficacy: toward a unifying theory of behavioral change’, *Psychological Review*, 84(2), pp. 191–215.
<https://doi.org/10.1037/0033-295X.84.2.191>
- 9) Bello, M. and Ajiboye, J. (2023) ‘AI-driven feedback systems and conceptual change in Nigerian higher education’, *International Journal of Digital Learning*, 11(3), pp. 88–102.
<https://scholar.google.com/scholar?q=AI-driven+feedback+systems+and+conceptual+change+in+Nigerian+higher+education>
- 10) Bonwell, C.C. and Eison, J.A. (1991) *Active learning: creating excitement in the classroom (ASHE-ERIC Higher Education Report No. 1)*. George Washington University. <https://eric.ed.gov/?id=ED336049>
- 11) EduTech Africa (2024) *State of AI adoption in Nigerian tertiary institutions: annual report 2024*. EduTech Africa Press.
<https://scholar.google.com/scholar?q=State+of+AI+adoption+in+Nigerian+tertiary+institutions+EduTech+Africa+2024>
- 12) Holmes, W., Bialik, M. and Fadel, C. (2021) *Artificial intelligence in education: promises and implications for teaching and learning*. Center for Curriculum Redesign. <https://curriculumredesign.org/wp-content/uploads/AIED-Book.pdf>
- 13) Luckin, R., Holmes, W., Griffiths, M. and Forcier, L.B. (2016) *Intelligence unleashed: an argument for AI in education*. Pearson.
<https://www.pearson.com/en-gb/subject-catalog/p/intelligence-unleashed/P200000005270>
- 14) Nguyen, H.X., Karagiannidis, C., Magoulas, G. and Chen, Q. (2024) ‘Equitable access to generative AI in developing countries: challenges

- and pathways', *Computers and Education: Artificial Intelligence*, 5, 100134. <https://doi.org/10.1016/j.caeai.2023.100134>
- 15) Ojo, I. and Akinola, S. (2021) 'Digital divide and AI adoption in Nigerian federal universities', *Nigerian Journal of Educational Technology*, 9(1), pp. 33–47. <https://scholar.google.com/scholar?q=Digital+divide+and+AI+adoption+in+Nigerian+federal+universities>
- 16) Piaget, J. (1972) *The principles of genetic epistemology*. Basic Books. <https://scholar.google.com/scholar?q=The+principles+of+genetic+epistemology+Piaget>
- 17) Posner, G.J., Strike, K.A., Hewson, P.W. and Gertzog, W.A. (1982) 'Accommodation of a scientific conception: toward a theory of conceptual change', *Science Education*, 66(2), pp. 211–227. <https://doi.org/10.1002/sce.3730660207>
- 18) Tavakol, M. and Dennick, R. (2011) 'Making sense of Cronbach's alpha', *International Journal of Medical Education*, 2, pp. 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- 19) UNESCO (2023) *Guidance for generative AI in education and research*. United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000387100>
- 20) Vygotsky, L.S. (1978) *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- 21) Zhou, Y. and Li, X. (2025) 'Generative AI and the future of student learning: patterns of use and implications for pedagogy', *British Journal of Educational Technology*, 56(1), pp. 120–137. <https://doi.org/10.1111/bjet.13456>