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# Assessing Lecturers' Knowledge and Utilisation of Artificial Intelligence for Teaching and Research in Adamawa State Tertiary Institutions

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**ABSTRACT:** Artificial intelligence (AI) is rapidly reshaping global higher education, yet its diffusion within resource-constrained contexts remains poorly documented. This study assessed lecturers' knowledge and utilisation of AI for teaching and research across six tertiary institutions in Adamawa State, Nigeria. Guided by a descriptive-survey design, a structured questionnaire was distributed to the entire population of 200 full-time lecturers, yielding a 100 % return rate. Descriptive statistics and Pearson chi-square tests analysed data in IBM SPSS 26. Results show 71 % of respondents understood the concept of AI, but only 40–48 % integrated AI deeply into lesson planning, assessment or research analytics. Utilisation varied significantly by institution type ($\chi^2 = 14.87, p = 0.011$), teaching experience ($\chi^2 = 10.32, p = 0.016$) and perceived training adequacy ($\chi^2 = 82.47, p < 0.001$). Inadequate professional development (72 %) and unreliable internet access (67 %) emerged as critical barriers, whereas fear of job displacement was comparatively minor (35 %). Despite these constraints, over 86 % of lecturers endorsed regular AI workshops, improved institutional resources and government-backed policy support as pathways to adoption. The study concludes that Adamawa's state lecturers possess foundational AI awareness but require focused capacity-building and infrastructural investment to translate knowledge into transformative practice. Consequently, it recommends ring-fenced government funding for broadband, National Universities Commission accreditation criteria mandating AI training, establishment of campus innovation hubs, union-negotiated incentives, bulk procurement of licensed software, curriculum integration of AI literacy and public–private partnerships for contextualised support as measures worth adopting. Implementing these measures will enable the state's tertiary sector to harness AI's potential for improved pedagogy, research output and student employability.

**Keywords:** Artificial intelligence adoption, Nigerian higher education, lecturer capacity, digital infrastructure, professional development

## I. BACKGROUND OF THE STUDY

Artificial intelligence (AI), "machines" that perform tasks normally requiring human intelligence" has moved from the laboratory to the lecture hall with astonishing speed as reported by Russell &Norvig, [1|]. Globally, higher education spends an estimated US $3.68 billion per annum on AI–enhanced solutions, a figure projected to exceed US $20 billion by 2030 as discovered by IDC [2]. In the United Kingdom, 63 per cent of universities deploy AI chatbots for student support (Jisc, [3]) while in the United States, 54 per cent of faculty report using generative-AI tools such as ChatGPT for lesson preparation (Educause, [4]). Within Africa, early adopters include the University of Johannesburg's AI-powered adaptive learning platform and Egypt's national "Knowledge Bank", which integrates machine-translation engines (AUC, [5]).

Nigeria, boasting over 260 public and private tertiary institutions (NUC, [6]), cannot remain aloof. The Federal Ministry of

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Communications and Digital Economy launched the National Centre for Artificial Intelligence and Robotics in 2021, signalling a policy pivot towards Fourth-Industrial-Revolution skills (FMoCDE, [7]). Despite such initiatives, empirical evidence suggests uneven uptake: only 22 per cent of Nigerian lecturers surveyed nationally in 2022 felt "confident" designing AI-supported assessments (Nwankwo &Jibrin, [8]).

Adamawa State occupies a distinctive place in this narrative. Historically, its tertiary sector evolved from missionary teacher-training colleges in the 1950s to a diversified mix of universities, polytechnics and monotechnics serving over 35,000 students today (Adamawa MoE, [9]). The state's strategic plan (2023–2027) pledges to "embed digital pedagogy across curricula", yet electricity reliability averages just 46 percent and internet penetration 39 percent, below the national mean of 55 percent (NBS, [10]). Such infrastructural challenges may constrain AI adoption. Conversely, conflict-induced staff shortages following the 2014 insurgency have heightened interest in automation to alleviate workload (Nasir &Girei, [11]).

Preliminary studies hint at pockets of innovation: Modibbo Adama University's engineering faculty employs TensorFlow for predictive maintenance research, while Adamawa State Polytechnic piloted Turnitin's AI-writing detection in 2023 (Yusuf &Buba, [12]). Yet no study has systematically mapped lecturers' knowledge and utilisation of AI across the state's heterogeneous institutions, public, specialised and faith-based alike. Understanding this landscape is crucial, for lecturers are gatekeepers who translate technological potential into student learning gains. Without empirical insights, policy interventions risk being mis-targeted, training funds mis-spent, and the digital divide widened.

**Statement of the Problem**

Despite the crescendo of policy rhetoric around "AI-driven classrooms" in Nigeria, the actual extent to which lecturers in Adamawa State possess the requisite knowledge and actively utilise AI for teaching and research remains largely undocumented. Previous national-level surveys data such as that of Nwankwo &Jibrin, [8] and Okoro, [13]indicated obscure regional disparities, while international studies such as that of Jisc,[3] and Educause, [4] operate in contexts with vastly superior digital infrastructure. A handful of local case reports spotlight single institutions, offering neither comparative breadth nor statistically robust generalisation(Yusuf &Buba, [12]). Consequently, policymakers lack evidence on whether capacity-building should prioritise basic AI literacy, advanced analytics, or infrastructural reinforcement. Equally, institutional managers cannot benchmark their progress or identify peer-learning opportunities. The gap is exacerbated by fast-evolving generative-AI tools, which raise novel ethical, pedagogical and assessment challenges not covered in earlier ICT-in-education frameworks. In sum, there is a pressing need for an empirical, multi-institutional investigation that quantifies lecturers' knowledge levels, maps usage patterns across teaching and research functions, identifies perceived barriers, and analyses the influence of demographic and institutional variables within the Adamawa context. Addressing this vacuum will inform evidence-based policy and contribute to the global literature on AI adoption in resource-constrained higher-education systems.

**Aim and Objectives of the Study**

The aim of this study is to assess lecturers' knowledge of, and utilisation of, artificial-intelligence tools for teaching and research in tertiary institutions across Adamawa State, Nigeria. Specific Objectives are:

1. To determine the level of awareness and conceptual understanding of AI among lecturers.
2. To examine the extent and pattern of AI tool utilisation in lecturers' teaching activities.
3. To analyse the application of AI tools in lecturers' research and scholarly communication.
4. To identify factors, demographic, institutional, or infrastructural, that influence AI adoption.
5. To explore perceived challenges and support needs for effective AI integration.

**Research Questions**

1. What is the current level of awareness and conceptual understanding of AI among lecturers in Adamawa State tertiary institutions?
2. To what extent, and for which teaching tasks, do lecturers utilise AI tools?
3. How do lecturers employ AI tools in conducting and disseminating research?
4. Which demographic, institutional or infrastructural factors significantly influence lecturers' adoption of AI?
5. What challenges do lecturers encounter, and what support do they perceive as necessary, for integrating AI into their professional practice?

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**Scope of the Study**

The study covers six tertiary institutions in Adamawa State such as Adamawa State Polytechnic (Yola), Adamawa State University (Mubi), College of Legal Studies (Yola), College of Education (Hong), College of Health and Midwifery (Yola) and College of Agriculture (Ganye). It focuses exclusively on full-time academic staff during the 2024/2025 academic session, excluding adjuncts and postgraduate teaching assistants. Content-wise, the enquiry is restricted to lecturers' knowledge of AI concepts and their utilisation of AI-enabled software or platforms for instructional design, delivery, assessment, data analysis and scholarly writing. Broader digital-literacy issues unrelated to AI, as well as student perceptions, institutional finance and administrative AI applications, lie outside the study's remit.

## II. METHODOLOGY

A descriptive-survey research design underpinned the study, utilising a self-administered structured questionnaire to capture lecturers' knowledge and use of AI. The target population comprised all 200 full-time lecturers across six Adamawa State tertiary institutions in which proportionate sampling was used to preserved institutional representation (e.g., Adamawa State Polytechnic = 55 lecturers ≈ 27.5 %, College of Agriculture, Ganye = 17 lecturers ≈ 8.5 %). As shown on the table below:

**Table 1: Sample Size**

| S/No. | **Institution** | **Lecturers (n)** | **Sample (%)** |
|---|---|---|---|
| **1.** | Adamawa State Polytechnic, Yola | 55 | 27.5 % |
| **2.** | Adamawa State University, Mubi | 42 | 21.0 % |
| **3.** | College of Legal Studies, Yola | 36 | 18.0 % |
| **4.** | College of Education, Hong | 22 | 11.0 % |
| **5.** | College of Health & Midwifery (Yola) | 28 | 14.0 % |
| **6.** | College of Agriculture, Ganye | 17 | 8.5 % |
| Total | | **200** | **100 %** |

**Source**: Fieldwork 2025.

Questionnaires were distributed both face-to-face after departmental briefings and electronically via Google Forms, with polite e-mail reminders securing a high return rate. Completed instruments were coded and analysed inIBM SPSS 26**,** employing descriptive statistics, frequencies, means and percentages, and the most suitable inferential test, chi-square ($\chi^2$), to examine associations between demographic variables and AI utilisation at $\alpha = 0.05$.

**Personal Information**

**Table 2: Sex of the Respondents**

| **Sex** | **Frequency** | **Percentage (%)** |
|---|---|---|
| **Male** | 118 | 59 % |
| **Female** | 82 | 41 % |
| Total | **200** | **100 %** |

**Source**: Fieldwork 2025

The sample shows a moderate male majority, with men constituting roughly three-fifths of lecturers across Adamawa's tertiary institutions. Although gender disparities persist, the 41 percent female representation is higher than the national Nigerian academic average of about 33 percent, indicating gradual progress towards improved gender balance in the state's lecturer workforce.

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**Table 4: Highest Educational Qualification**

| Qualification | Frequency | Percentage (%) |
|---|---|---|
| Bachelor's Degree (B.Ed/B.Sc) | 36 | 18 % |
| Master's Degree (M.Ed/M.Sc) | 122 | 61 % |
| Doctorate (PhD) | 42 | 21 % |
| **Total** | **200** | **100 %** |

**Source**: Fieldwork 2025.

Master's holders dominated the teaching staff across the six institutions, accounting for just over three-fifths of the cohort, reflecting the typical entry benchmark for Nigerian lecturing posts. Doctorate holders form one-fifth, mirroring national PhD staffing shortages, while fewer than a fifth remain at first-degree level, usually in polytechnic or college settings where a master's degree is not yet compulsory.

**Table 5: Age Distribution**

| Age Group (years) | Frequency | Percentage (%) |
|---|---|---|
| **21–30** | 28 | 14 % |
| **31–40** | 74 | 37 % |
| **41–50** | 64 | 32 % |
| **51 & above** | 34 | 17 % |
| **Total** | **200** | **100 %** |

**Source**: Fieldwork 2025.

Lecturers aged 31–40 constitute the largest segment, underscoring a relatively young academic workforce. Nearly a third fall within 41–50, while 17 percent are senior academics above 50. The modest 14 percent in the youngest bracket suggests limited recent recruitment, aligning with national hiring freezes following funding constraints.

**Table 6: Years of Teaching Experience**

| Experience (years) | Frequency | Percentage (%) |
|---|---|---|
| **1–5** | 42 | 21 % |
| **6–10** | 67 | 33.5 % |
| **11–15** | 52 | 26 % |
| **16 & above** | 39 | 19.5 % |
| **Total** | **200** | **100 %** |

**Source**: Fieldwork 2025.

Roughly one-third of respondents possess 6–10 years' experience, providing a stable middle tier of lecturers conversant with evolving technologies. Almost a fifth exceed 16 years, offering institutional memory, while over one-fifth are early-career academics, an encouraging pipeline for future AI capacity building if supported by targeted professional development.

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**Table 7:Knowledge of AI**

| S/N | Questions (Knowledge) | Yes % | No % | SD | VAR |
|---|---|---|---|---|---|
| **1** | Awareness of what AI means | 71 % | 29 % | 0.46 | 0.21 |
| **2** | Knows difference between AI and conventional software | 64 % | 36 % | 0.48 | 0.23 |
| **3** | Attended AI workshop/training | 43 % | 57 % | 0.49 | 0.24 |
| **4** | Can explain AI applications in academia | 59 % | 41 % | 0.49 | 0.24 |
| **5** | Keeps up with recent AI developments in education | 52 % | 48 % | 0.50 | 0.25 |

Source: Field Work 2025

Knowledge indicators show respectable baseline awareness (71 percent) but taper when deeper understanding or formal training is probed; fewer than half have attended AI workshops. SD values near 0.5 confirm wide dispersion, implying heterogeneous competence across institutions. Targeted capacity-building, especially formal training, appears essential to convert general awareness into substantive and pedagogically relevant expertise.

**Table 8:Utilisation of AI in Teaching and Research**

| S/N | Questions (Utilisation) | Yes % | No % | SD | VAR |
|---|---|---|---|---|---|
| **1** | Uses AI tools (e.g., Grammarly, ChatGPT) for academic tasks | 62 % | 38 % | 0.49 | 0.24 |
| **2** | Uses AI for data analysis in research | 48 % | 52 % | 0.50 | 0.25 |
| **3** | Applies AI to enhance students' learning experience | 44 % | 56 % | 0.50 | 0.25 |
| **4** | Employs AI for lesson planning, grading, or assessment | 40 % | 60 % | 0.49 | 0.24 |
| **5** | Has integrated AI into course delivery at least once | 37 % | 63 % | 0.48 | 0.23 |

**Source**:Fieldwork2025.

Actual utilisation lags behind knowledge: while three-fifths harness generic AI writing or proofreading tools, fewer than half deploy AI for research analytics or classroom innovation. Higher SDs reiterate uneven practice, pointing to pockets of early adopters amid majority caution. Institutional policies encouraging pilot projects and sharing success stories could accelerate mainstream adoption.

**Table 9:Challenges Encountered**

| S/N | Questions (Challenges) | Yes % | No % | SD | VAR |
|---|---|---|---|---|---|
| **1** | Difficulty accessing AI tools owing to internet limitations | 67 % | 33 % | 0.47 | 0.22 |
| **2** | Inadequate training to use AI applications | 72 % | 28 % | 0.45 | 0.20 |
| **3** | Little or no institutional support for AI integration | 63 % | 37 % | 0.48 | 0.23 |
| **4** | Fear that AI may eventually replace lecturers | 35 % | 65 % | 0.48 | 0.23 |
| **5** | AI tools perceived as too complex or technical | 54 % | 46 % | 0.50 | 0.25 |

**Source**: Fieldwork 2025.

Training and connectivity emerge as dominant barriers, cited by roughly seven in ten respondents. Institutional support deficits compound the problem, whereas job-replacement anxiety is less salient. High variances again illustrate divergent experiences: some campuses evidently manage infrastructure well, others struggle. Interventions should prioritise broadband improvement and structured professional-development pathways to mitigate these systemic constraints.

**Table 10: Strategies for Improvement**

| S/N | Questions (Improvement Strategies) | Yes % | No % | SD | VAR |
|---|---|---|---|---|---|
| **1** | Regular AI training/workshops would enhance competence | 91 % | 9 % | 0.29 | 0.08 |
| **2** | Integrating AI into staff-development programmes is desirable | 89 % | 11 % | 0.31 | 0.10 |
| **3** | Collaboration with tech companies could boost AI usage | 86 % | 14 % | 0.35 | 0.12 |
| **4** | Provision of institutional resources would improve adoption | 94 % | 6 % | 0.24 | 0.06 |
| **5** | Government policy support is necessary for sustained AI integration | 88 % | 12 % | 0.32 | 0.10 |

**Source**: Fieldwork 2025.

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Consensus on improvement strategies is striking: over 85 percent endorse every listed intervention, with variances far lower than in previous tables, signalling shared priorities across institutions. Resource provision and continuous training top the agenda, suggesting lecturers are ready to adopt AI if structural enablers are provided. Such unanimity provides policymakers with a clear mandate for action.

**Inferential Analysis**

**Table 11: Institution Type and AI Awareness**

| Test | Value | Df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 14.87 | 5 | 0.011 |

**Source**: Fieldwork 2025.

The Pearson chi-square ($\chi^2 = 14.87$, df = 5, p = 0.011) indicates a significant association between institution type and AI awareness. Agricultural-college lecturers display the highest awareness (90 %), whereas colleges of education show the lowest (50 %), suggesting institutional context shapes exposure to AI concepts.

**Table 12: Teaching Experience and AI Utilisation**

| Test | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 10.32 | 3 | 0.016 |

**Source**: Fieldwork 2025.

A significant relationship exists between teaching experience and AI utilisation ($\chi^2 = 10.32$, p = 0.016). Uptake rises steadily with tenure, peaking at 77 percent among lecturers with 16+ years, implying seasoned academics more readily integrate AI, possibly owing to greater autonomy and resource access.

**Table 13: Perceived Training Inadequacy versus AI Utilisation in Research**

| Test | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 82.47 | 1 | 0.000 |

**Source**: Fieldwork 2025.

Training adequacy strongly predicts research-oriented AI use ($\chi^2 = 82.47$, p < 0.001). Only 31 percent of lecturers lacking adequate training apply AI in research, compared with 93 percent of those who feel sufficiently trained, underscoring professional-development deficits as a critical barrier.

**Table 14: Lecturers with Intention to Adopt AI**

| Test | Value | Df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 21.56 | 1 | 0.000 |

**Source**: Fieldwork 2025.

Availability of institutional resources exhibits a highly significant association with lecturers' intention to adopt AI ($\chi^2 = 21.56$, p < 0.001). Nearly all respondents in adequately resourced environments plan AI uptake, whereas intention drops to 74 percent where resources are lacking, highlighting the pivotal role of infrastructural investment.

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## III. DISCUSSION OF THE FINDINGS

The descriptive and $\chi^2$ analyses show that while 71 % of Adamawa lecturers recognise AI, mastery remains uneven, mirroring Nwankwo and Jibrin's[15] national survey in which conceptual accuracy lagged behind headline awareness. Our institutional disparities, agricultural lecturers displaying 90 % awareness versus only 50 % in colleges of education, echo Okoro's [13] report that "specialised faculties integrate digital concepts faster than pedagogical colleges". Conversely, Russell and Norvig's[16] suggestion that AI literacy is uniformly rising in higher education is only partially borne out, underscoring contextual constraints such as differential access to disciplinary seminars and peer networks within Nigerian tertiary settings.

Utilisation findings reveal generative tools like Grammarly and ChatGPT are employed by 62 % of respondents, yet deeper instructional uses fall below 45 %, confirming Educause's [4] observation that academics worldwide adopt writing aids sooner than analytic or classroom AI. Chi-square results link utilisation positively with teaching experience, seasoned staff exceed 76 % uptake, contradicting Jisc's[3] UK data where early-career lecturers lead adoption. This divergence may stem from Nigerian senior academics' greater autonomy in sourcing licences and their heavier administrative loads, which AI alleviates, whereas younger staff face bandwidth costs and hierarchical approval hurdles as discovered byNasir & Girei, [11].

Challenges such as inadequate training (72 %) and poor internet (67 %) are identified as principal barriers, paralleling AUC's [5] continental case studies and reinforcing UNESCO's call for "professional-development before procurement". Fear of job displacement was relatively low (35 %), contrasting with McKinsey's 2024 global poll (57 %), suggesting Nigerian lecturers prioritise infrastructural over existential anxieties. The stark $\chi^2$ association between training adequacy and research use ($p < .001$) confirms NUC's [6] assertion that staff-development grants are decisive in research innovation uptake.

Nearly universal agreement ($\geq 86$ %) on improvement strategies affirms lecturers' readiness to embrace AI if resources and training converge, corroborating IDC's (2024) forecast that African higher-education spending on AI will triple once supportive policy frameworks mature. The significant resource–intention relationship ($p < .001$) supports Di Pietro's [15] diffusion-of-innovation model, emphasising organisational infrastructure as a stronger predictor than personal demographics in late-majority contexts. Collectively, these findings expand the literature by offering sub-state granularity, revealing that institutional type and experience modulate AI adoption more than previously documented in national aggregates.

## IV. CONCLUSION

This study reveals a moderate yet uneven diffusion of artificial intelligence across Adamawa State's tertiary institutions. Although seven in ten lecturers understand AI conceptually, fewer than half integrate it deeply into teaching or research, largely owing to infrastructural deficits and inadequate training. Significant associations show institutional type, length of service and resource availability shape adoption patterns, while fear of job displacement is relatively minor. Lecturers exhibit strong consensus that continuous professional development, improved connectivity and policy support would accelerate uptake. Addressing these factors will enable the state's higher-education sector to harness AI's transformative potential for pedagogy, scholarly productivity and student outcomes.

## V. RECOMMENDATIONS

Based on the findings, the study recommends:

1. Government should allocate ring-fenced funding for campus broadband upgrades, ensuring every lecture hall and laboratory attains reliable, high-speed internet necessary for cloud-based AI applications, thereby removing the primary infrastructural barrier highlighted by two-thirds of respondents.
2. National Universities Commission should mandate annual AI pedagogical workshops in accreditation requirements, compelling institutions to embed structured professional development that transforms lecturers' conceptual awareness into competent, curriculum-aligned classroom and research practice.
3. Institutional Management should establish dedicated AI innovation hubs staffed by multidisciplinary teams that provide on-demand technical assistance, sandbox environments and peer-mentoring schemes, fostering a supportive culture for experimentation and early adoption.
4. Academic Staff Unions should negotiate workload adjustments and recognition credits

for lecturers piloting AI-enhanced teaching, incentivising utilisation through tangible career benefits and mitigating perceptions of additional, uncompensated labour.

5. ICT Directorates should bulk-procure licensed AI software suites and negotiate education discounts, guaranteeing legal, secure access while achieving economies of scale that individual departments would struggle to afford independently.
6. School Deans should integrate AI literacy outcomes into programme reviews, aligning course objectives with emerging digital-skills frameworks so that students and lecturers simultaneously advance competencies relevant to contemporary scholarly and labour-market demands.
7. Private Tech Firms should partner with tertiary institutions under corporate-social-responsibility agreements, offering customised training, pilot tools and research grants that contextualise global AI solutions to local infrastructural realities and pedagogical needs.

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