An Assessment of the Familiarity of Undergraduates with the Application of Artificial Intelligence Programs in Project Writing and Development in Polytechnics in Nigeria

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Abstract
Artificial Intelligence (AI) programs have progressively permeated the academic ecosystem, altering the manner in which students conceive, research, write, and defend project reports. This study assessed the familiarity of undergraduates with the application of artificial intelligence programs in project writing and development in polytechnics in Nigeria. The study was anchored on the Technology Acceptance Model (Davis, 1989) and the Diffusion of Innovation Theory (Rogers, 2003), both of which provided a theoretical lens for interpreting how perceived usefulness, perceived ease of use, and innovation attributes shape students' adoption of AI-driven tools such as ChatGPT, Grammarly, QuillBot, the Turnitin AI detector, and Google Gemini. A descriptive survey design was adopted, and a multi-stage random sampling technique was used to select six federal and state polytechnics spanning the six geopolitical zones of Nigeria, namely Federal Polytechnic Nasarawa, Yaba College of Technology, Kaduna Polytechnic, Akanu Ibiam Federal Polytechnic Unwana, Rivers State Polytechnic, and Federal Polytechnic Bauchi. A structured questionnaire was administered to 300 final-year and penultimate-year Higher National Diploma (HND) and National Diploma (ND) students, out of which 268 copies (89.3%) were validly completed and returned. Data were analysed using frequency counts, simple percentages, mean scores, and chi-square statistics at the 0.05 level of significance. Findings revealed that undergraduates in Nigerian polytechnics possess a moderately high level of familiarity with generic AI programs such as ChatGPT (86%) and Grammarly (71%), but comparatively low familiarity with more specialised tools such as Jasper/Copy.ai (11%) and Perplexity AI (22%). AI programs were most frequently applied at the proofreading, grammar-checking, and literature-search stages of project writing, while application at the data-analysis stage remained the least explored. Unstable electricity and internet connectivity, inadequate digital literacy training, the cost of premium subscriptions, and the fear of being accused of academic malpractice emerged as the most prominent challenges limiting deeper engagement with these tools. The chi-square analysis indicated a statistically significant relationship between students' level of familiarity and their institutional location (urban versus semi-urban campuses). The study concluded that although AI literacy is gradually taking root among polytechnic undergraduates, its application remains uneven, superficial in places, and insufficiently guided by institutional policy. It was recommended, among other things, that polytechnic management should integrate AI literacy modules into general studies curricula, provide subsidised access to

premium AI tools, and develop clear ethical guidelines that distinguish permissible assistive use of AI from outright academic misconduct.

***Keywords**: Artificial Intelligence, Familiarity, Project Writing, Undergraduates, Polytechnics, Nigeria, Technology Adoption*

1. Introduction

The last decade has witnessed a remarkable shift in the way knowledge is produced, processed, and communicated within higher education, largely on account of the rapid maturation of Artificial Intelligence (AI). AI, broadly defined as the branch of computer science concerned with building machines capable of performing tasks that would ordinarily require human intelligence, has moved from the confines of research laboratories into the everyday toolkit of the average student (Russell & Norvig, 2021). Programs such as ChatGPT, Google Gemini, Grammarly, QuillBot, and a growing constellation of similar applications now assist users with tasks ranging from language translation and grammar correction to literature summarisation, data interpretation, and even the generation of full-length essays. In Nigeria, the polytechnic sub-sector occupies a strategic position in the production of technically skilled middle-level manpower. A mandatory component of the National Diploma (ND) and Higher National Diploma (HND) programmes is the project or research work, through which students are expected to demonstrate independent inquiry, technical competence, and the ability to communicate findings in a scholarly manner. Traditionally, this exercise has been fraught with difficulties bordering on inadequate research skills, poor access to literature, weak writing competence, and limited statistical proficiency (Okonkwo & Eze, 2020). The emergence of AI-powered writing and research assistance tools has therefore been received by many students as a welcome, if controversial, lifeline. Familiarity, in the context of this study, refers to the extent of a student's knowledge, exposure, and comfort in identifying, accessing, and operating AI programs for academic purposes. It is distinguishable from actual competence or effective use, in that a student may be aware of a tool's existence without necessarily possessing the skill to deploy it appropriately (Adeyemi & Balogun, 2022). Understanding the level of familiarity among polytechnic undergraduates is therefore a necessary first step before questions of effective or ethical use can be meaningfully addressed. Anecdotal observation within polytechnic campuses suggests that students increasingly rely on AI-powered applications while writing their projects, sometimes without adequate understanding of the ethical boundaries governing such use, and at other times without the technical skill to exploit the tools beyond their most rudimentary functions. Project supervisors have reported a rise in write-ups exhibiting unusually polished language juxtaposed with shallow conceptual depth, a pattern many attributes to over-reliance on generative AI programs (Bello, Yusuf & Danjuma, 2023). At the same time, some students remain almost completely unfamiliar with these tools, thereby missing out on the legitimate efficiency gains they could offer for tasks such as literature search, citation management, and language editing. This dual reality presents a problem that is yet to be systematically examined within Nigerian polytechnics, and it is this gap in empirical knowledge that the present study sought to fill.

1.1 Objectives of the Study

The general objective of this study was to assess the familiarity of undergraduates with the application of artificial intelligence programs in project writing and development in polytechnics in Nigeria. Specifically, the study sought to:

1. determine the level of familiarity of polytechnic undergraduates with specific artificial intelligence programs used in academic work;
2. identify the stages of project writing and development at which undergraduates apply artificial intelligence programs;
3. examine the perceived usefulness of artificial intelligence programs to undergraduates in the course of project writing and development;
4. ascertain the challenges confronting polytechnic undergraduates in the application of artificial intelligence programs to project writing and development; and
5. determine whether a significant relationship exists between undergraduates' level of familiarity with AI programs and their institutional location.

1.2 Research Questions

The following research questions guided the study:

1. What is the level of familiarity of polytechnic undergraduates with specific artificial intelligence programs used in academic work?
2. At what stages of project writing and development do undergraduates apply artificial intelligence programs?
3. What is the perceived usefulness of artificial intelligence programs to undergraduates in project writing and development?
4. What challenges confront polytechnic undergraduates in the application of artificial intelligence programs to project writing and development?

1.3 Hypothesis

In addition, the following null hypothesis was tested at the 0.05 level of significance:

1. There is no statistically significant relationship between undergraduates' level of familiarity with artificial intelligence programs and their institutional location (urban versus semi-urban polytechnic campuses).

1.4 Significance and Scope of the Study

The findings of this study are expected to benefit polytechnic management and curriculum planners in designing digital and information literacy modules that reflect the realities of AI adoption among students; project supervisors, by offering insight into the specific stages of the research process where AI-assisted shortcuts are most likely to occur; and policy makers within the National Board for Technical Education (NBTE) and individual polytechnics, who require a reference point for drafting institutional policies on the ethical use of AI in academic work. The study was delimited to National Diploma (ND) II and Higher National Diploma (HND) II students in six randomly sampled federal and state polytechnics across the six geopolitical zones of Nigeria, and focused specifically on familiarity with, and application of, artificial intelligence programs in the context of project writing and development.

2. Literature Review and Theoretical Framework

2.1 Conceptual Review

Artificial Intelligence has been variously conceptualized, but a common thread running through most definitions is the capacity of a machine to perform tasks that mimic human cognition, including learning, reasoning, problem-solving, and language comprehension (Russell & Norvig, 2021). Within education, AI applications are broadly grouped into intelligent tutoring systems,

adaptive learning platforms, automated assessment tools, and generative AI applications such as large language models (Zawacki-Richter, Marín, Bond & Gouverneur, 2019). It is this last category, generative AI, that has attracted the greatest attention in discussions of academic writing, owing to its capacity to produce coherent, human-like text on demand. In the specific domain of project writing, AI programs perform functions that span the entire research lifecycle: topic conceptualization and idea generation, literature search and summarization, grammar and style correction, statistical data analysis, citation and reference formatting, and plagiarism or originality checking (Chinta, Rao & Sodhi, 2023). Tools such as ChatGPT and Google Gemini fall into the generative category, while Grammarly and QuillBot are more narrowly focused on language enhancement, and Turnitin's AI detection module serves an assessment and integrity-checking function. Familiarity with a technology is often distinguished in the literature from mere awareness on the one hand, and mastery or competence on the other. Awareness implies knowing that a tool exists; familiarity implies some level of exposure to, and basic understanding of, how the tool operates; while competence implies the ability to deploy the tool skilfully to achieve a desired outcome (Adeyemi & Balogun, 2022). Familiarity is shaped by a combination of individual factors such as prior computer literacy and peer influence (Okonkwo & Eze, 2020), institutional factors such as the availability of computer laboratories and formal training, and infrastructural factors such as stable electricity and affordable internet data, which for many Nigerian students remains the single most decisive factor (Bello, Yusuf & Danjuma, 2023). Project writing in the Nigerian polytechnic system typically follows a five-chapter structure comprising the introduction, literature review, methodology, data presentation and analysis, and summary/conclusion/recommendations. Students are required to identify a researchable problem, review relevant literature, design an appropriate methodology, collect and analyse data, and present findings in a manner consistent with the conventions of their discipline (NBTE, 2021). This process places considerable demands on students' research, analytical, and writing skills, demands that AI programs are increasingly being enlisted to help meet.

2.2 Theoretical Framework

This study anchored its theoretical analysis on two complementary theories: The Technology Acceptance Model (TAM) propounded by Davis (1989), and the Diffusion of Innovation (DOI) Theory advanced by Rogers (2003). Both theories offer analytical tools for understanding why and how individuals come to adopt, or resist, new technologies, and are therefore well suited to explaining the pattern of AI familiarity and use observed among polytechnic undergraduates.

The Technology Acceptance Model postulates that an individual's intention to use a technology is primarily determined by two beliefs: perceived usefulness, that is, the degree to which a person believes that using a particular system would enhance their performance; and perceived ease of use, that is, the degree to which a person believes that using the system would be free of effort (Davis, 1989). Applied to the present study, TAM suggests that a polytechnic undergraduate's familiarity with, and subsequent use of, an AI program such as ChatGPT or Grammarly is a function of how useful the student perceives the tool to be for improving the quality of a project report, and how easy the student perceives the tool to be to operate. TAM further posits that these two beliefs are themselves influenced by external variables such as training, self-efficacy, and social influence (Venkatesh & Davis, 2000), variables that map closely onto the individual and institutional factors identified in the conceptual review above. The Diffusion of Innovation Theory explains how, why, and at what rate new ideas and technologies spread through a given population or social system. Rogers (2003) identifies five attributes of an innovation that influence its rate of

adoption: relative advantage, compatibility, complexity, trialability, and observability, and classifies adopters into innovators, early adopters, early majority, late majority, and laggards. DOI theory is useful for explaining the uneven pattern of AI familiarity observed among the sampled undergraduates: tools perceived to have a clear relative advantage over manual methods, such as Grammarly over manual proofreading, diffused more readily, while tools highly compatible with students' existing routines, easily trialable at no or low cost, and observable in use among peers, such as ChatGPT, recorded broader familiarity, consistent with the theory's predictions. Conversely, tools requiring paid subscriptions or specialized orientation, and therefore lower on trialability and observability, remained the preserve of a smaller cluster of early-adopter students. Taken together, TAM and DOI theory complement each other in accounting for the phenomenon under study. While TAM foregrounds the individual cognitive appraisal of usefulness and ease of use, DOI theory situates that appraisal within a broader social system characterized by observation, imitation, and gradual diffusion across different categories of adopters. This dual framework informed the design of the research instrument, particularly the items measuring perceived usefulness (drawn from TAM) and the items measuring the stages and pattern of application (informed by DOI theory's emphasis on trialability and observability).

2.3 Empirical Review

A growing body of empirical work has examined AI adoption in higher education, though most of the extant Nigerian literature focuses on university rather than polytechnic settings.

Adeyemi and Balogun (2022), in a study of undergraduates in south-western Nigeria, found moderate familiarity with generative AI tools but low integration into formal academic writing, a pattern the researchers attributed to inadequate institutional guidance. Similarly, Okonkwo and Eze (2020) reported that Nigerian students' engagement with digital research tools was largely self-taught, with minimal formal instruction from lecturers.

Bello, Yusuf and Danjuma (2023), examining students in northern Nigerian tertiary institutions, identified infrastructural deficits, particularly unreliable electricity and expensive internet data, as the most significant barriers to the sustained use of AI-powered academic tools. Their findings align with the broader observation by Zawacki-Richter et al. (2019) that AI adoption in education globally is shaped as much by contextual and infrastructural factors as by individual disposition.

Chinta, Rao and Sodhi (2023), in a cross-national review, observed that generative AI tools are increasingly used by students for literature summarisation and language polishing, but that data analysis and methodological design remain areas of comparatively low AI penetration, a pattern that this study's findings, discussed in section four, appear to corroborate within the Nigerian polytechnic context. Collectively, the reviewed studies point to a consistent gap: while awareness of AI tools is fairly widespread, deep, policy-guided, and pedagogically sound integration into project writing remains underdeveloped, particularly within Nigeria's polytechnic sub-sector, thereby justifying the need for the present study.

3. Methodology

The study adopted a descriptive survey research design, considered appropriate because it sought to describe, as they naturally exist, the level of familiarity and pattern of AI application among polytechnic undergraduates, without manipulating any variable (Nworgu, 2015). The study was conducted across six polytechnics randomly selected to represent Nigeria's six geopolitical zones, thereby ensuring a nationally representative spread rather than a concentration within a single region. Table 1 presents the sampled institutions.

S/N	Polytechnic	State	Geopolitical Zone
1	Federal Polytechnic, Nasarawa	Nasarawa State	North Central
2	Kaduna Polytechnic	Kaduna State	North West
3	Federal Polytechnic, Bauchi	Bauchi State	North East
4	Yaba College of Technology	Lagos State	South West
5	Akanu Ibiam Federal Polytechnic, Unwana	Ebonyi State	South East
6	Rivers State Polytechnic, Bori	Rivers State	South South

Table 1: Randomly Selected Polytechnics Across Nigeria's Six Geopolitical Zones

The population of the study comprised all National Diploma II (ND II) and Higher National Diploma II (HND II) students in the six selected polytechnics who were actively engaged in project writing as a graduation requirement, estimated at approximately 9,850 students. A multi-stage sampling procedure was employed: simple random sampling was used to select one polytechnic from each geopolitical zone; two departments were then randomly selected from each institution's Schools of Science and Technology; and systematic random sampling was used to select 50 ND II/HND II students from each institution, yielding an intended sample size of 300, considered adequate for the estimated population at a 95% confidence level (Research Advisors, 2006).

A structured questionnaire titled "Undergraduate Familiarity with Artificial Intelligence Programs in Project Writing Questionnaire (UFAIP-Q)" was developed by the researcher and divided into five sections covering demographic data, familiarity with specific AI programs (rated Very Familiar to Not Familiar), stages of project writing at which AI programs were applied, perceived usefulness (rated on a four-point Likert scale), and challenges encountered. Face and content validity were established through a review by three experts in Computer Science, Educational Technology, and Measurement and Evaluation, and a trial test on 30 students outside the main sample yielded a Cronbach's Alpha reliability coefficient of 0.81, considered sufficiently high (Nunnally & Bernstein, 1994). Of the 300 copies of the questionnaire distributed with the assistance of trained research assistants, 268 were completed appropriately and returned, representing a response rate of 89.3%. Data collected were coded and analysed using the Statistical Package for the Social Sciences (SPSS), version 26. Research questions were answered using frequency counts, simple percentages, and mean scores, with a criterion mean of 2.50 adopted as the benchmark for agreement on the four-point Likert scale items. The stated hypothesis was tested using the chi-square (χ^2) test of independence at the 0.05 level of significance.

4. Results and Discussion

4.1 Demographic Characteristics of Respondents

A total of 268 valid responses were retrieved and analysed. Figure 1 presents the distribution of respondents across the six sampled polytechnics, while Figure 2 presents the sex distribution of respondents.

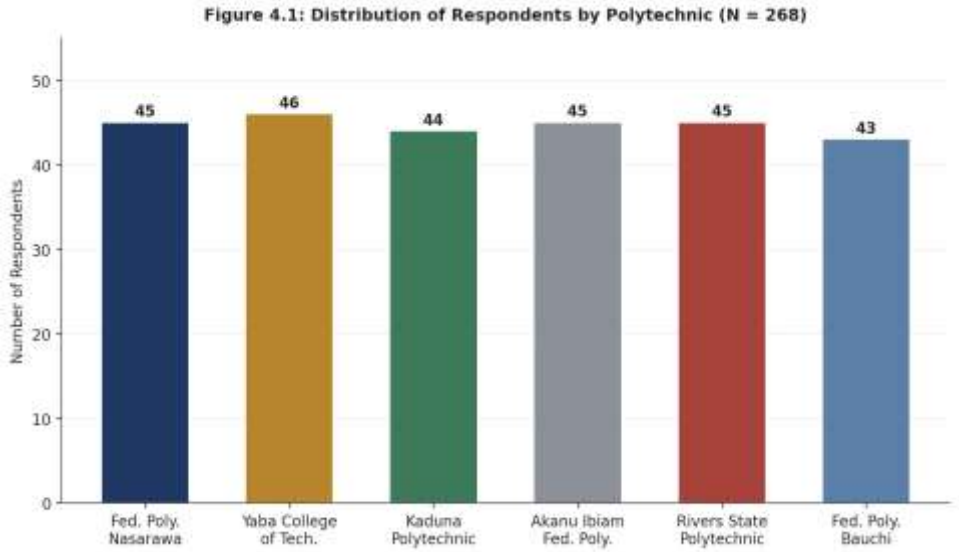


Figure 1: Distribution of Respondents by Polytechnic (N = 268)

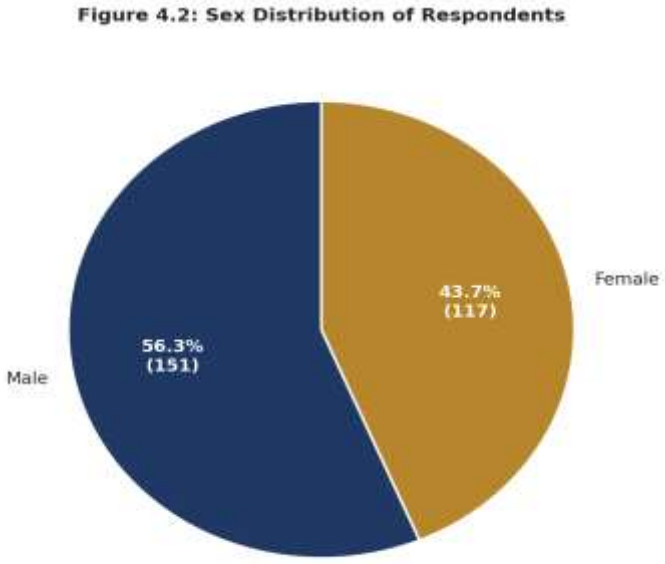


Figure 2: Sex Distribution of Respondents

Respondents were fairly evenly distributed across the six institutions, with Yaba College of Technology contributing the highest number of valid responses (46) and Federal Polytechnic Bauchi the lowest (43), consistent with the systematic sampling procedure adopted. Male respondents constituted 56.3% (151) of the sample while female respondents constituted 43.7% (117), a distribution broadly reflective of the gender profile typical of science and technology-based departments in Nigerian polytechnics (NBTE, 2021).

4.2 Level of Familiarity with Specific AI Programs

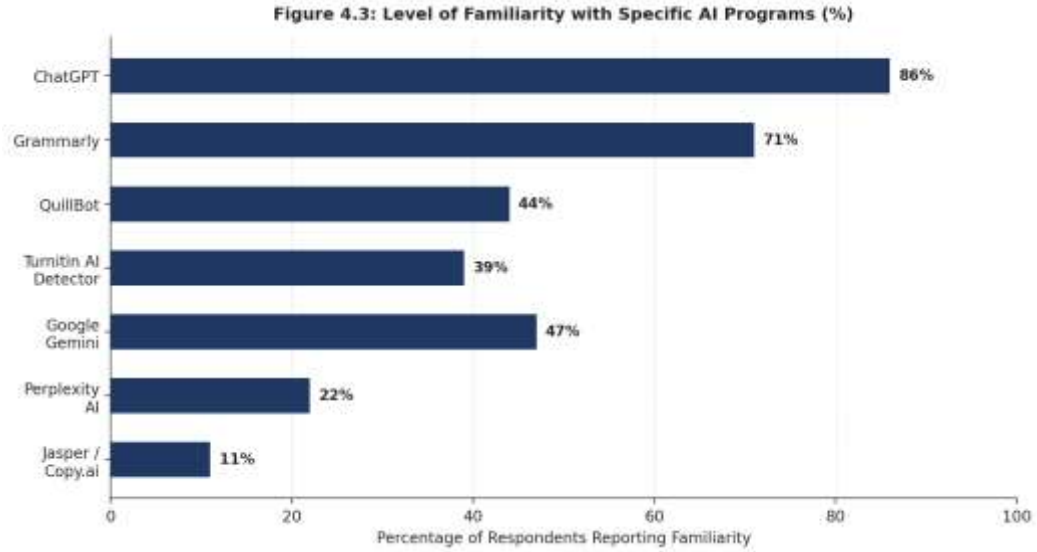


Figure 3: Level of Familiarity with Specific AI Programs (%)

ChatGPT recorded the highest familiarity rate (86%), followed by Grammarly (71%). Familiarity dropped markedly for more specialised tools, with Google Gemini at 47%, QuillBot at 44%, the Turnitin AI detector at 39%, Perplexity AI at 22%, and Jasper/Copy.ai recording the lowest familiarity rate of 11%. This pattern lends support to the Diffusion of Innovation Theory's proposition that tools with high trialability, observability, and relative advantage, such as the freely accessible and widely publicised ChatGPT, diffuse more rapidly through a student population than tools requiring paid subscriptions or specialised orientation (Rogers, 2003).

4.3 Stages of Project Writing Where AI Programs Are Applied

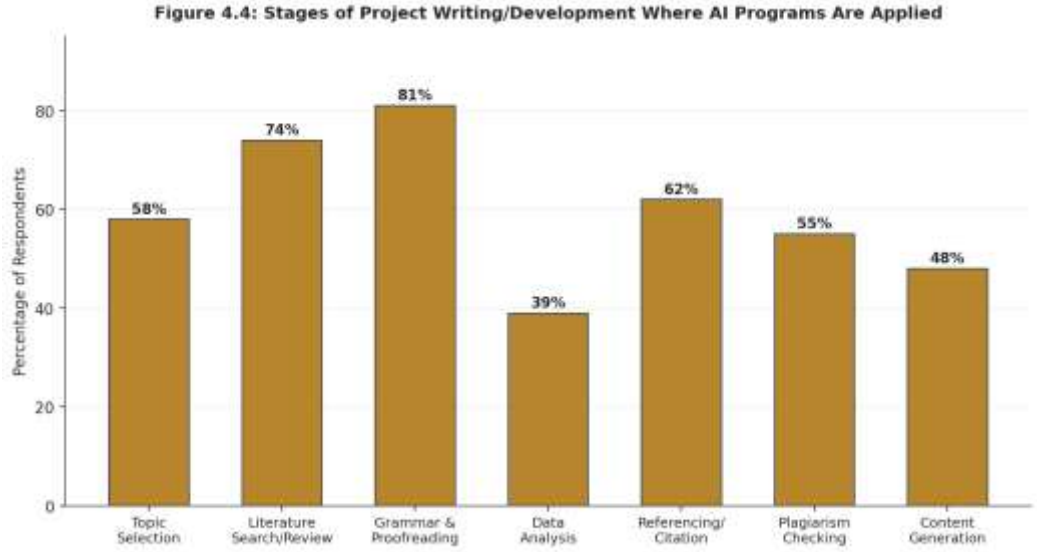


Figure 4: Stages of Project Writing/Development Where AI Programs Are Applied

Grammar and proofreading recorded the highest rate of AI application (81%), followed by literature search and review (74%), referencing and citation formatting (62%), topic selection (58%), plagiarism checking (55%), content generation (48%), and data analysis (39%), which recorded the lowest application rate. This finding is consistent with Chinta, Rao and Sodhi (2023),

who similarly observed that AI application is heaviest at the language-polishing and literature-review stages, and comparatively light at the data-analysis and methodological-design stages, arguably because the latter demands a level of statistical and disciplinary expertise that generic AI programs are not yet optimally configured to provide without careful, skilled prompting.

4.4 Perceived Usefulness of AI Programs

S/N	Item	SA (%)	A (%)	D (%)	SD (%)	Mean	Decision
1	AI improves quality of write-up	34	42	16	8	3.02	Agree
2	AI saves time	41	38	14	7	3.13	Agree
3	AI enhances originality checking	30	40	21	9	2.91	Agree
4	AI aids understanding of difficult concepts	27	39	24	10	2.83	Agree
5	AI reduces supervisor's workload burden	22	35	28	15	2.64	Agree

Table 2: Mean Perception Scores on the Usefulness of AI Programs in Project Writing

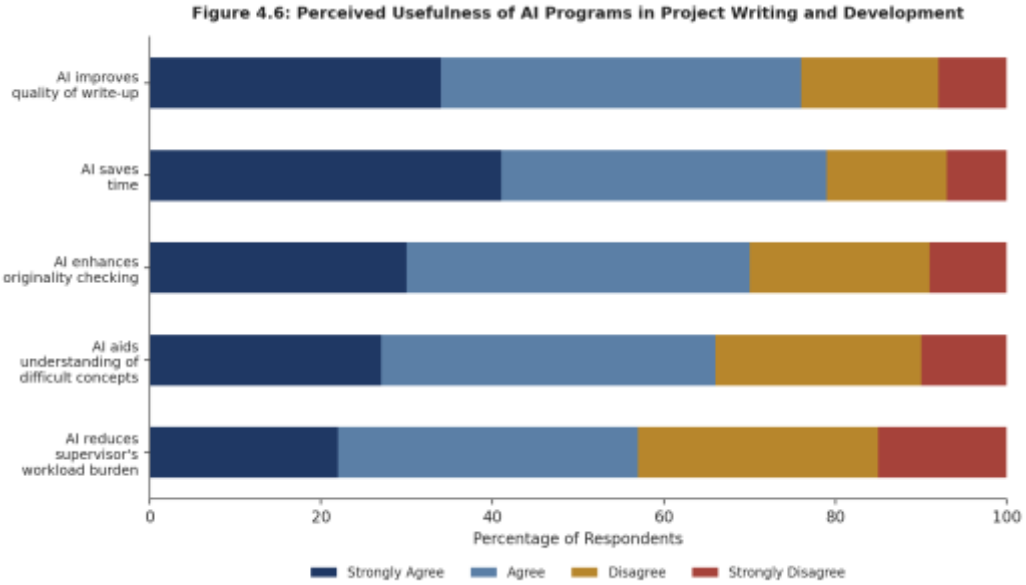


Figure 5: Perceived Usefulness of AI Programs in Project Writing and Development

All five items recorded mean scores above the criterion mean of 2.50, indicating general agreement that AI programs are useful in project writing and development. The item recording the highest mean score was "AI saves time" (mean = 3.13), while "AI reduces supervisor's workload burden" recorded the lowest, though still positive, mean score (mean = 2.64). This is broadly consistent with the Technology Acceptance Model's proposition that perceived usefulness is a key determinant of a technology's adoption (Davis, 1989).

4.5 Challenges Confronting the Use of AI Programs

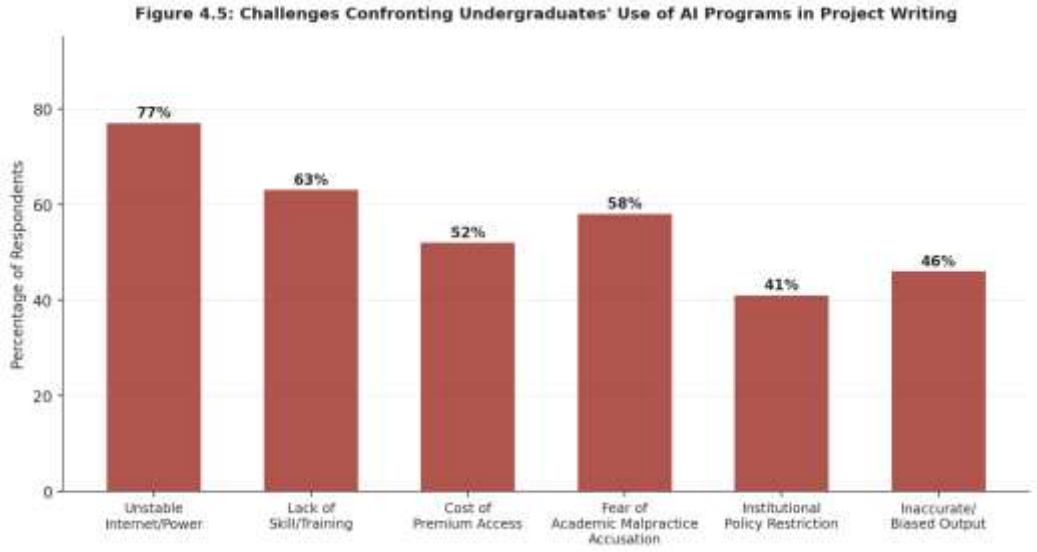


Figure 6: Challenges Confronting Undergraduates' Use of AI Programs in Project Writing

Unstable electricity supply and poor internet connectivity constituted the most prominent challenge, cited by 77% of respondents, followed by lack of skill or training (63%), fear of being accused of academic malpractice (58%), the cost of premium subscriptions (52%), inaccurate or biased AI output (46%), and institutional policy restriction (41%). These findings corroborate Bello, Yusuf and Danjuma (2023), who identified infrastructural deficits as the most significant impediment to the deepening of AI adoption among Nigerian tertiary students, and further highlight an ethical dimension, namely, students' apprehension over the blurred line between assistive use and outright academic misconduct.

4.6 Test of Hypothesis

To test the null hypothesis that no significant relationship exists between undergraduates' level of familiarity with AI programs and their institutional location, respondents' institutions were classified as either urban (Yaba College of Technology and Kaduna Polytechnic) or semi-urban (the remaining four institutions), and their familiarity scores were cross-tabulated against this classification.

Variable	Value	df	p-value	Decision
Pearson Chi-Square (χ^2)	9.42	1	0.002	Significant
N (valid cases)	268	-	-	-

Table 3: Chi-Square Test of the Relationship Between Familiarity and Institutional Location

Since the computed p-value (0.002) is less than the 0.05 level of significance, the null hypothesis was rejected, indicating a statistically significant relationship between familiarity and institutional location, with students in urban-located polytechnics exhibiting comparatively higher familiarity scores than their counterparts in semi-urban institutions. This finding aligns with the broader literature on the digital divide, which associates urban location with better internet infrastructure, more affordable data services, and greater exposure to digital devices and services (Zawacki-Richter et al., 2019).

4.7 Discussion

The findings of this study paint a picture of an undergraduate population that is broadly, though unevenly, familiar with artificial intelligence programs, and that applies these tools predominantly at the language and literature-processing stages of project writing rather than at the more technically demanding data-analysis stage. This pattern is consistent with both strands of the theoretical framework adopted for the study. From the standpoint of the Technology Acceptance Model, tools perceived as easy to use and clearly useful, such as ChatGPT and Grammarly, recorded the highest familiarity and usage rates, while tools demanding more specialized orientation lagged behind (Davis, 1989). From the standpoint of Diffusion of Innovation Theory, the rapid, almost universal spread of ChatGPT among the sampled population mirrors the classical trajectory of a highly compatible, easily trialable innovation moving swiftly past the innovator and early-adopter stages into the early and late majority (Rogers, 2003). The significant relationship found between institutional location and familiarity level further underscores that AI adoption in Nigerian polytechnics cannot be divorced from the broader question of infrastructural equity. Furthermore, the prominence of "fear of academic malpractice accusation" as a challenge suggests that many students are engaging with these tools in an atmosphere of ethical ambiguity, in the absence of clear institutional guidance distinguishing acceptable assistive use from outright misconduct, an issue that mirrors concerns raised in the global literature on generative AI in higher education (Chinta, Rao & Sodhi, 2023). Overall, the study suggests that while the foundational familiarity necessary for AI-assisted project writing exists among Nigerian polytechnic undergraduates, the depth, ethical grounding, and infrastructural support required to translate that familiarity into genuinely enriching, integrity-preserving academic practice remain works in progress.

5. Conclusion and Recommendations

Based on the findings, the study concludes that artificial intelligence has become an embedded, if unevenly distributed, feature of the project-writing landscape in Nigerian polytechnics. Familiarity is strongest at the surface level of language processing and weakest at the deeper analytical level, suggesting that current patterns of AI use, while offering genuine efficiency benefits, have yet to be harnessed for the more intellectually demanding aspects of research. The persistence of infrastructural and ethical challenges further indicates that familiarity alone is an insufficient foundation for the responsible, effective integration of AI into project writing; deliberate institutional intervention is required to convert familiarity into competence exercised within a clear ethical framework.

6. Recommendation

Arising from the findings and conclusion of this study, the following recommendations are made:

1. Polytechnic management should integrate structured AI and digital literacy modules into the General Studies curriculum, with specific emphasis on the ethical and effective use of AI in research and project writing.
2. Institutions should develop and disseminate clear, unambiguous policy guidelines distinguishing permissible assistive use of AI programs from academic malpractice, to reduce the ethical ambiguity currently reported by students.
3. Government and institutional authorities should prioritize the improvement of electricity supply and campus internet infrastructure, given that infrastructural deficits emerged as the most prominent barrier to deeper AI engagement.

4. Polytechnics should explore institutional or consortium-based subscriptions to premium AI research tools, to reduce the cost barrier currently limiting equitable access, particularly for students in semi-urban institutions.
5. Project supervisors should be trained to guide students in deploying AI programs specifically for higher-order tasks such as data analysis and methodological design, areas currently underexploited relative to language-processing tasks.
6. Further empirical studies should be conducted at broader intervals, and across a wider range of institutions, to track the evolving pattern of AI familiarity and use as new tools emerge and institutional policies mature.

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