

Adoption and Effectiveness of E-Learning Platforms in Auchi Polytechnic

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Abstract— The rapid global expansion of digital learning technologies has prompted Nigerian tertiary institutions to accelerate the adoption of electronic learning platforms. Auchi Polytechnic, Edo State, occupies a significant position in the Nigerian polytechnic education system, yet systematic documentation of how its students adopt and experience e-learning platforms is absent from the scholarly literature. This study evaluates the extent of adoption and perceived effectiveness of e-learning platforms among students at Auchi Polytechnic, examining awareness, usage patterns, TAM-based perceptions, gratifications, and structural barriers to engagement. A descriptive survey design was employed. A structured questionnaire was administered to 380 randomly selected students. Three hundred and forty-two completed questionnaires were retrieved and deemed usable. Data were analysed using descriptive statistics, Likert scale mean scores, and chi-square tests. The Technology Acceptance Model served as the theoretical framework. Findings show that 91% of respondents were aware of e-learning platforms, with 76% having used at least one platform previously, yet regular usage stood at only 43%. Poor internet connectivity was cited as a barrier by 78%, unstable electricity by 71%, high data costs by 69%, lack of personal devices by 64%, and insufficient training by 52%. Perceived usefulness and ease of use rose significantly with academic progression. Moodle LMS was the most preferred platform at 34%, followed by Google Classroom at 28%. Chi-square analysis confirmed statistically significant relationships between usage level and all TAM perception indicators at p less than 0.01. E-learning adoption at Auchi Polytechnic is growing but hampered by structural infrastructure deficits. Policy interventions targeting internet connectivity, device access, electricity supply, and digital training are essential to realise the full educational potential of e-learning platforms at the institution.

Keywords: *e-learning; adoption; effectiveness; Auchi Polytechnic; Technology Acceptance Model; learning management system; Nigeria; higher education; digital divide*

I. INTRODUCTION

Electronic learning, broadly defined as education delivered or facilitated through digital technologies including learning management systems, web-based assessments, and

virtual classrooms, has transformed the global higher education landscape over the past two decades [1]. In Nigeria, this transformation has been uneven, reflecting the country's persistent infrastructure challenges. However, the COVID-19 pandemic of 2020 and its attendant school closures constituted an unavoidable inflection point that compelled higher educational institutions to accelerate engagement with digital learning tools or face complete cessation of academic activities [2]. Auchi Polytechnic, established in 1963 in Edo State, is one of Nigeria's foremost polytechnic institutions, enrolling thousands of students across schools of engineering, science, management, and humanities. The institution began deploying elements of e-learning infrastructure prior to the pandemic, and the Blackboard Learning Management System has been formally integrated into its instructional framework, as evidenced by institutional communications directing students to complete orientation courses on the platform. Yet despite these steps, empirical documentation of the extent to which students have adopted e-learning platforms and of the platforms' effectiveness from a student perspective remains absent from the literature.

This study addresses that gap by applying the Technology Acceptance Model as a theoretical lens to evaluate how Auchi Polytechnic students perceive and use e-learning platforms, what gratifications they obtain or fail to obtain, and what structural barriers constrain effective adoption. The remainder of the paper reviews the literature and theoretical framework in Section 2, describes the methodology in Section 3, presents findings with figures and tables in Section 4, discusses results in Section 5, and provides conclusions and recommendations in Section 6.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A. E-Learning in Nigerian Higher and Polytechnic Education

A study on the challenges and prospects of e-learning in Nigerian polytechnic education found that the most common form adopted in polytechnics is lecture-based digital content delivery, with interactive and assessment-integrated platforms less prevalent [3]. The study recommended

government and private sector investment in equipping polytechnic e-learning centres with modern equipment. A major review of e-learning adoption in Nigerian higher institutions concluded that capacity-building activities, active partnerships, and infrastructure investment are central to harnessing e-learning for sustainable development [4].

Post-COVID evidence deepens this picture. A study of 237 undergraduate students from seven Nigerian universities in the post-COVID era documented that e-learning presents significant challenges including poor internet connectivity, device unavailability, and insufficient platform training [5]. A survey among nursing and radiography undergraduates found that 62.2% engaged in online learning during the pandemic, underscoring both the potential and the readiness for digital adoption while revealing significant socioeconomic disparities in access [6].

B. Learning Management Systems in West African Universities

A study surveying 51 lecturers from 11 universities in Ghana and Nigeria gauged perceptions of Moodle LMS using the Technology Acceptance Model and revealed consistently positive views, with lecturers citing user-friendly interface and capacity for collaboration, while identifying resource adequacy as the key area for improvement [7]. A study at Kwara State Colleges of Education concluded that Moodle-based learning improved students' performance and retention more effectively than hybrid approaches, recommending broader adoption alongside continued hybrid elements [8]. Research using PLS-SEM among Ghanaian undergraduates found that system quality, information quality, and user self-efficacy significantly influence LMS utilisation and academic performance [9].

C. Barriers to E-Learning Adoption

An evaluative analysis of barriers and enablers of e-learning adoption among Nigerian undergraduates published in 2025 found that only 36% of Nigerian tertiary institutions had structured e-learning systems, with less than 20% reporting consistent digital access. Significant positive relationships were found between perceived usefulness and adoption intention, with r equal to 0.62 at p less than 0.01 [10]. Research on the digital divide in Nigeria identified electricity access, device ownership, data affordability, and internet connectivity as the four most commonly reported barriers among students attempting online learning [11].

D. Technology Acceptance Model

Developed by Davis in 1989, the Technology Acceptance Model posits that adoption of information technology is predicted by two beliefs: Perceived Usefulness,

defined as the degree to which a user believes the system enhances their performance; and Perceived Ease of Use, defined as the degree to which a user believes the system is free of effort [12]. A study using extended TAM in northeastern Nigerian higher education confirmed that both constructs strongly predict students' and academics' behavioural intentions to use e-learning [13]. A systematic review of TAM for online education found that computer self-efficacy, subjective norms, and perceived enjoyment are additional significant determinants of perceived ease of use and usefulness, jointly shaping adoption intention [14].

III. METHODOLOGY

A. Research Design, Population, and Sampling

A descriptive survey research design was adopted, consistent with the established methodological convention in e-learning adoption studies across Nigerian higher education. The study was conducted at Auchi Polytechnic, Auchi, Edo State. The target population comprised all registered students during the 2024 to 2025 academic session. A sample of 380 students was drawn using stratified random sampling, with strata defined by school of enrolment. This size is consistent with Yamane's formula for finite populations and with comparable Nigerian studies. Three hundred and forty-two questionnaires were retrieved and found usable, representing a 90.0% response rate.

B. Instrument and Data Analysis

A structured questionnaire covered four thematic sections: sociodemographic information; e-learning awareness and platform usage; perceived usefulness and ease of use measured on a five-point Likert scale; and barriers to adoption. The instrument was pre-tested on 30 students excluded from the main sample, yielding a Cronbach's alpha of 0.84. Data were analysed using IBM SPSS version 26. Descriptive statistics, mean scores, and chi-square tests were applied. Likert scores of 3.50 and above were interpreted as positive, 2.50 to 3.49 as moderate, and below 2.50 as negative.

IV. RESULTS

A. Sociodemographic Profile

Of the 342 usable respondents, 198 (57.9%) were male and 144 (42.1%) were female. The age distribution showed that 68.7% were between 18 and 25 years. The sample covered all schools of the polytechnic, with Engineering at 26.9%, Management Studies at 22.8%, Science and Technology at 21.3%, and other schools comprising the remaining 28.9%.

Variable	Frequency	Percentage (%)
Gender: Male	198	57.9
Gender: Female	144	42.1
Age 18 to 25 years	235	68.7
Age 26 to 35 years	84	24.6
Age 36 and above	23	6.7
School of Engineering	92	26.9
School of Management Studies	78	22.8
School of Science and Technology	73	21.3
Other Schools	99	28.9

Table 1: Sociodemographic Profile of Respondents (n = 342)

Figure 2: Preferred E-Learning Platform Among Auchu Polytechnic Students (n = 342)

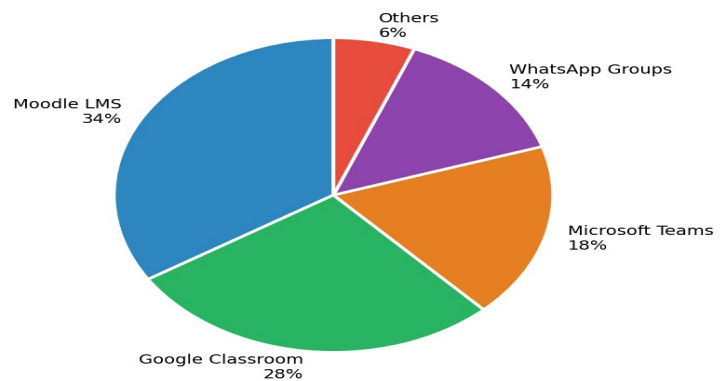


Figure 2: Preferred E-Learning Platform Among Auchu Polytechnic Students (n = 342)

B. Awareness and Usage of E-Learning Platforms

Figure 1 presents the distribution of key e-learning awareness and usage indicators. Awareness was high at 91%, with 76% having used at least one platform. Regular usage was considerably lower at 43%, and 24% reported never using any platform. Fifty-eight percent stated a preference for e-learning over conventional classroom delivery.

Figure 1: Awareness and Usage of E-Learning Platforms Among Auchu Polytechnic Students (n = 342)

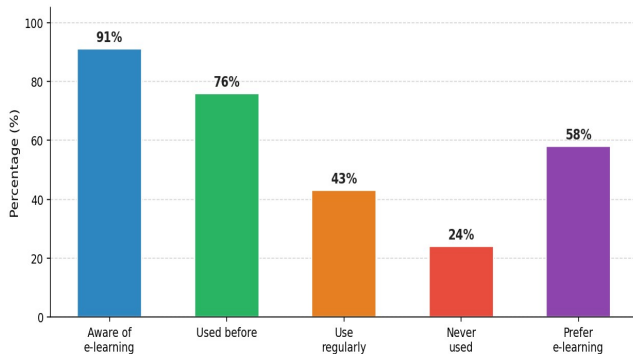


Figure 1: Awareness and Usage of E-Learning Platforms Among Auchu Polytechnic Students (n = 342)

Figure 2 presents the distribution of preferred platforms. Moodle LMS was the most preferred at 34%, followed by Google Classroom at 28%, Microsoft Teams at 18%, WhatsApp groups at 14%, and other platforms at 6%. The strong preference for Moodle reflects the institutional integration of LMS-based instruction.

C. TAM Perception Scores

TAM Construct and Item	Mean	SD	Interpretation
E-learning improves my academic performance	3.72	0.81	Positive
E-learning platforms save study time	3.58	0.94	Positive
E-learning allows flexible learning	3.91	0.74	Positive
E-learning platforms are easy to navigate	3.14	1.02	Moderate
I find it easy to access materials online	2.89	1.11	Moderate
I am satisfied with e-learning content quality	3.45	0.88	Positive
E-learning complements face-to-face teaching	3.83	0.77	Positive
Overall, e-learning is effective at my institution	3.29	0.97	Moderate

Table 2: TAM Likert Scale Ratings of Perceived Usefulness and Ease of Use (1 = Strongly Disagree; 5 = Strongly Agree)

Table 2 shows that e-learning flexibility received the highest rating (mean 3.91), followed by the view that e-learning complements face-to-face instruction (mean 3.83) and improves academic performance (mean 3.72). Ease of access to online materials received the lowest rating at 2.89, directly reflecting infrastructure constraints. Overall institutional effectiveness was rated moderately at 3.29.

Figure 3 plots perceived usefulness, ease of use, and overall satisfaction across academic year levels, revealing a consistent upward trend from 100 level through HND 2. This pattern is consistent with TAM predictions that actual usage experience builds digital competence and reinforces positive adoption perceptions over time.

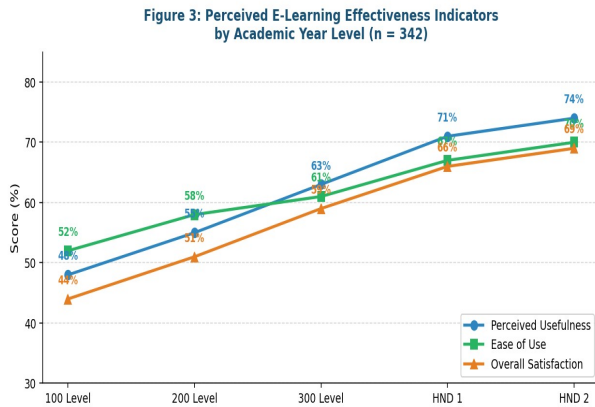


Figure 3: Perceived E-Learning Effectiveness Indicators by Academic Year Level (n = 342)

D. Barriers to E-Learning Adoption

Figure 4 presents the proportion of respondents identifying each structural barrier. Poor internet connectivity was cited most frequently at 78%, followed by unstable electricity at 71%, high data subscription costs at 69%, lack of personal devices at 64%, insufficient training at 52%, and poor LMS design at 38%.

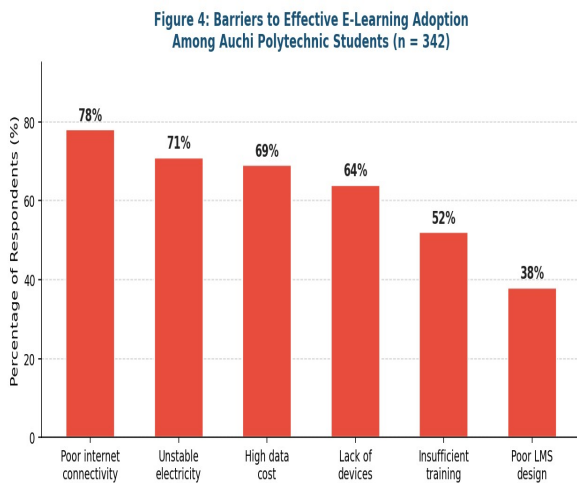


Figure 4: Barriers to Effective E-Learning Adoption Among Auchu Polytechnic Students (n = 342, multiple responses permitted)

Satisfied with content quality (%)	71.4	49.6	22.0	52.16 (<0.01)
Would recommend e-learning (%)	79.6	57.5	34.1	44.07 (<0.01)

Table 3: Relationship Between E-Learning Usage Level and TAM Perception Indicators (Chi-square Analysis)

Table 3 confirms statistically significant relationships at p less than 0.01 between usage level and all TAM perception indicators. Regular users reported substantially higher perceived usefulness (74.8%), ease of use (68.0%), content satisfaction (71.4%), and recommendation intention (79.6%) compared to occasional users and non-users. This pattern validates the TAM model's core prediction that usage experience reinforces positive adoption perceptions.

V. DISCUSSION

A. The Awareness-Engagement Gap

The finding that 91% of respondents are aware of e-learning platforms but only 43% use them regularly is consistent with the broader Nigerian higher education pattern. The 2025 evaluative analysis of Nigerian undergraduate e-learning barriers found that only 36% of institutions had structured systems, with less than 20% of students reporting consistent digital access [10]. The Auchu Polytechnic figures are more favourable, reflecting the institution's formal LMS integration, but the gap remains structural in origin rather than attitudinal. Students who want to engage are constrained by connectivity, electricity, and device access rather than by unwillingness.

The rising TAM scores across academic year levels in Figure 3 align with the cognitive absorption mechanism identified in the TAM literature. As students accumulate experience with institutional e-learning tools across semesters, their confidence and perceived value of those tools both increase, driving the upward trend in perceived usefulness, ease of use, and overall satisfaction observed from 100 level through HND 2.

B. Infrastructure as the Binding Constraint

The dominance of connectivity (78%) and electricity (71%) as barriers in Figure 4 mirrors findings from across the Nigerian and West African literature. Research on the digital divide during the COVID-19 pandemic in Nigeria documented that electricity, device ownership, data cost, and connectivity were the four most common barriers to student online

Variable	Regular Users (n=147)	Occasional Users (n=113)	Non-Users (n=82)	Chi-square (p)
High perceived usefulness (%)	74.8	58.4	31.7	47.23 (<0.01)
High perceived ease of use (%)	68.0	51.3	28.0	39.84 (<0.01)

learning, with 38% specifically citing data costs as their primary constraint [11]. The Auchi Polytechnic findings replicate this national pattern in the polytechnic context, confirming that these are systemic rather than institution-specific problems.

The 52% citing insufficient training is a particularly actionable finding. Unlike physical infrastructure, structured digital skills training can be delivered within the institution through mandatory orientation programmes and peer learning schemes at relatively low cost. Research on LMS effectiveness consistently identifies user self-efficacy, built through training, as a significant predictor of platform satisfaction [9]. Targeting this modifiable barrier represents the most immediate institutional lever available.

C. Platform Preferences and Institutional LMS Strategy

The preference for Moodle LMS (34%) alongside the significant proportion using Google Classroom (28%) and WhatsApp groups (14%) suggests that students are pragmatically using the most accessible platforms when formal institutional LMS access is constrained. A study of Moodle LMS in 11 West African universities confirmed positive views where connectivity and devices are managed, but identified resource adequacy as the key moderator between platform perception and actual use [7]. Consolidating institutional e-learning delivery onto a single well-supported platform and ensuring adequate connectivity and devices for its use is the strategic priority that the evidence supports.

VI. CONCLUSION AND RECOMMENDATIONS

This study has provided the first systematic empirical documentation of e-learning adoption and effectiveness at Auchi Polytechnic. Key findings are that awareness is high at 91% but regular usage stands at 43%; infrastructure barriers dominate, with connectivity cited by 78% and electricity by 71%; TAM perceptions rise consistently with academic year; and usage level is significantly associated with positive TAM scores at p less than 0.01 across all indicators. Five concrete recommendations follow from the evidence.

First, Auchi Polytechnic should formally invest in campus-wide internet infrastructure and subsidised or free student data access, as connectivity is the single most cited and most impactful barrier. Second, a mandatory digital skills orientation programme should be integrated into the first-semester curriculum for all incoming students, directly addressing the 52% who cite insufficient training as a constraint. Third, the institution should formalise its e-learning strategy around a single institutional LMS, providing consistent technical support, staff training, and content development to ensure platform quality matches student

expectations. Fourth, the administration should engage with TETFund's instructional technology funding instruments and external development partners to bridge the capital gap for physical infrastructure improvement. Fifth, the institution should establish a regular student feedback mechanism for e-learning platform evaluation, ensuring that content quality, platform design, and scheduling remain responsive to evolving student needs.

This study contributes original empirical evidence on e-learning adoption in the Nigerian polytechnic context and validates the Technology Acceptance Model as a predictive framework in this setting. Future research should extend these findings through longitudinal designs tracking adoption changes over successive academic sessions and through qualitative methods capturing the detailed lived experiences of both students and academic staff in navigating Auchi Polytechnic's evolving digital learning environment.

VII. DECLARATIONS

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Data Availability: Primary data are available from the corresponding author upon reasonable request.

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