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ADOPTION OF E-LEARNING ANALYTICS FOR EVALUATING STUDENTS' PERFORMANCE IN BUSINESS EDUCATION PROGRAMMES IN NORTH CENTRAL NIGERIAN UNIVERSITIES

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Abstract

The study investigated the extent of adoption of e-learning analytics for evaluating students performance in Business Education programmes in North Central Nigerian universities, with focus on the benefits, challenges, and implications for teaching and learning. Four research questions in line with the purposes of the study guided the work. A descriptive survey research design was adopted. The population comprised 292 respondents (86 lecturers and 206 final-year Business Education students) drawn from four universities offering Business Education in North Central Nigeria. A sample of 169 was determined using the Yamane formula, and stratified random sampling was employed to ensure representation. A structured questionnaire titled Adoption of E-learning Analytics for Evaluating Student Performance Questionnaire (AELEASPQ) was developed, validated by experts, and used for data collection. Data were analyzed using mean and standard deviation to answer the research questions. The findings revealed that the extent of adoption of e-learning analytics tools such as LMS dashboards, predictive models, and early-warning systems is still low. However, respondents acknowledged benefits such as improved teaching effectiveness, timely student feedback, and data-driven decision-making. Challenges identified included inadequate infrastructure, poor digital literacy, and lack of institutional support. Based on the findings, it was recommended that universities in North Central Nigeria provide capacity-building training for lecturers, invest in ICT infrastructure, and integrate e-learning analytics into institutional policies to strengthen evaluation processes and improve student performance.

Keywords: *E-learning analytics, Business Education, Student Performance, Adoption*

Background

In today's digital era, In today's digital era, universities across the world face increasing pressure to modernize their teaching, learning, and evaluation processes through advanced technological tools. Higher education is no longer bound by traditional assessment methods; it is increasingly driven by data, digital tools, and analytics to improve the efficiency and quality of teaching, learning, and evaluation. This trend is now a strategic necessity rather than a luxury. Universities are evolving into data-informed institutions, where analytics have become important for institutional operations and decision-making (EDUCAUSE, 2018). One of the technologies contributing to this development is e-learning analytics, which enables institutions to collect, analyse, and interpret data generated from students' interactions with digital learning platforms.

E-learning analytics, sometimes referred to as learning analytics, involves the measurement, collection, analysis, and reporting of data about learners and their learning contexts for the purpose of understanding and improving learning and the environments in which it occurs (Leitner et al., 2019). According to Ifenthaler and Yau (2020), e-learning analytics makes use of digital traces generated by students on learning management systems and other digital platforms to provide information that can support teaching and learning. Such data may include students' logins, participation in online discussions, time spent on learning tasks, quiz results, assignment submissions, and other learning activities. These data can be presented through tools such as dashboards, early-warning systems, learning-path visualisers, and predictive models, which enable lecturers and institutions to monitor

students' learning activities and performance. In the context of this study, e-learning analytics refers to the systematic use of digital data and analytical tools by universities to monitor, evaluate, and improve the learning progress and performance of students in Business Education programmes.

The adoption of e-learning analytics is closely connected to its potential benefits for students, lecturers, and institutions. When properly adopted, analytics can provide timely information about students' participation and progress, help lecturers identify students who may require additional academic support, and enable evidence-based decisions about teaching and evaluation. Dashboards, for example, can provide lecturers and students with visual information about learning activities and performance, while early-warning systems can help identify students who are at risk of poor academic outcomes. Predictive models can also be used to identify patterns in students' learning behaviour and provide information that may support early intervention (Ifenthaler & Yau, 2020). These benefits are particularly relevant to Business Education, where students are expected to develop competencies in areas such as accounting, management, entrepreneurship, office technology, problem-solving, decision-making, and communication. The use of analytics can therefore provide information not only about students' final scores but also about their participation, learning processes and evaluation.

Evaluation is another important issue in the use of e-learning analytics. Evaluation in Business Education is the structured process of determining the extent to which students have acquired the knowledge, skills, and competencies required for further education, employment, and enterprise development (Okoye et al., 2021). Traditionally, student performance is evaluated through examinations, tests, assignments, projects, practical activities, case studies, and other assessment methods. Although these methods remain important, e-learning analytics provides opportunities to complement them with continuous information about students' learning activities. For example, analytics can show patterns of participation, frequency of engagement, time spent on tasks, and performance across different learning activities. This can give lecturers a broader understanding of students' learning progress and provide information for timely feedback and instructional decisions (Ifenthaler & Yau, 2020). In this study, evaluation refers to the use of conventional assessment methods together with e-learning analytics to assess and interpret the performance of students in Business Education programmes.

The use of e-learning analytics is, however, not without challenges. Successful adoption requires appropriate digital infrastructure, reliable internet connectivity, adequate technical skills, institutional support, and clear policies guiding the use of digital data. Lecturers may also require training to interpret and apply analytics information effectively. Inadequate knowledge, limited institutional investment, poor connectivity, and resistance to changes in established evaluation practices can therefore affect the adoption of analytics. Al-Emran et al. (2019) noted that technology adoption in education is influenced by users' willingness to accept and integrate new technologies into teaching and learning. Similarly, institutional conditions can determine whether available technologies become part of regular educational practice. Thus, the availability of e-learning analytics tools does not necessarily mean that universities have successfully adopted them.

Globally, higher education institutions are increasingly embedding technology into teaching, learning, and assessment practices. Universities in Europe, Asia, and North America are using learning analytics to monitor student participation, identify academic risks, and support teaching and learning decisions (Gašević et al., 2019). However, adoption varies across institutions and educational contexts. In Nigeria, adoption of educational technologies has been affected by infrastructural deficits, limited ICT training, and inconsistent policy support (Afolayan et al., 2021). These challenges may limit the extent to which universities can use analytics to support student performance evaluation. Effective adoption therefore requires more than the provision of technological tools; it also requires strategies

such as lecturer training, adequate infrastructure, institutional support, clear policies, technical assistance, and awareness of the benefits of analytics.

The situation raises particular concerns for Business Education programmes because the quality of student evaluation has implications for the competencies and employability of graduates. Business Education students are expected to acquire both theoretical knowledge and practical competencies that can prepare them for employment, entrepreneurship, and further professional development. Effective evaluation should therefore provide timely and useful information about students' progress and areas requiring improvement (Okoye et al., 2021). Where e-learning analytics is adequately adopted, lecturers may be better positioned to monitor students' learning activities, identify areas of difficulty, provide targeted feedback, and make informed instructional decisions. Conversely, limited adoption may reduce opportunities for universities to benefit from the information generated through students' digital learning activities.

In North Central Nigerian universities, the extent to which e-learning analytics has been integrated into the evaluation of student performance in Business Education programmes is not sufficiently clear. Although digital technologies are becoming increasingly important in higher education, concerns remain about infrastructure, technical expertise, institutional support, and the preparedness of lecturers and students to use analytics effectively. It is therefore necessary to determine the extent to which e-learning analytics has been adopted, the benefits perceived by lecturers and students, the challenges affecting its adoption, and the strategies that could improve its use. Examining these issues will provide evidence on the current state of e-learning analytics adoption and its potential role in improving the evaluation of student performance in Business Education programmes in North Central Nigerian universities.

Theoretical Framework

The Technology Acceptance Model (TAM) was proposed by Davis (1986) to explain how individuals come to accept and use new technologies. The model is based mainly on two factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that using a particular technology will improve his or her performance, while perceived ease of use refers to the extent to which the individual believes that using the technology will require little effort. According to TAM, when users believe that a technology is useful and easy to use, they are more likely to develop a favourable attitude towards it and eventually accept and use it. TAM is relevant to this study because the adoption of e-learning analytics depends partly on how lecturers and students perceive the technology. If lecturers believe that e-learning analytics can help them monitor student performance, identify students who need academic support, provide timely feedback, and improve evaluation, they are more likely to accept and use the technology. Similarly, if students perceive analytics tools as easy to understand and use, they may be more willing to engage with them. Thus, TAM provides a useful basis for understanding how perceived usefulness and perceived ease of use may influence the adoption of e-learning analytics in Business Education programmes in North Central Nigerian universities.

However, TAM has a limitation in the context of this study. Its main emphasis is on the individual's acceptance of technology, particularly the user's perception of usefulness and ease of use. It gives less attention to the wider institutional and social conditions that may determine whether a technology is actually adopted and sustained within an organisation. For example, a lecturer may consider e-learning analytics useful and easy to use but may still be unable to use it regularly because of poor internet connectivity, inadequate ICT infrastructure, lack of institutional support, insufficient training, or the absence of institutional policies. Since this study is concerned with adoption within universities rather than individual acceptance alone, TAM by itself may not fully explain the

institutional factors affecting adoption. This limitation provides a basis for complementing TAM with the Diffusion of Innovation Theory.

The Diffusion of Innovation (DOI) Theory was developed by Rogers in 1962 to explain how new ideas, practices, and technologies spread and become adopted within a social system. Rogers identified five major characteristics of an innovation that influence its rate of adoption: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to the perceived benefits of an innovation compared with an existing practice; compatibility concerns how well the innovation fits existing needs, values, and practices; complexity relates to how difficult the innovation is perceived to be; trialability refers to the opportunity to experiment with the innovation before full adoption; and observability concerns the extent to which the results of the innovation can be seen by others. DOI complements TAM in this study because it extends the explanation of adoption beyond individual perceptions to the institutional and social environment in which e-learning analytics is introduced. For example, universities may be more willing to adopt e-learning analytics when they perceive clear advantages over conventional approaches to student performance evaluation. Adoption may also be easier when analytics tools are compatible with existing learning management systems and evaluation practices, are not excessively complex, can be tested before full implementation, and produce visible improvements in student monitoring and evaluation. In the context of North Central Nigerian universities, factors such as infrastructure, institutional policies, staff training, technical support, and organisational readiness can also influence how the innovation spreads and becomes part of regular university practice.

Statement of the Problem

Universities are expected to leverage e-learning analytics as a modern tool for improving the quality of education. Ideally, these analytics should be used to track students' learning activities and progress, identify learners who may be at risk, and provide timely data that supports appropriate interventions. When effectively applied, e-learning analytics can assist lecturers in adjusting their teaching strategies, supporting personalized learning, and improving student outcomes. Globally, higher education institutions are increasingly using data-driven approaches to support teaching, learning, assessment, and institutional decision-making. This development places a growing expectation on universities to adopt technologies that can provide timely and useful information about students' learning and performance.

However, the situation in many universities in North Central Nigeria raises concerns about the extent to which e-learning analytics is being adopted for evaluating student performance. Although digital learning platforms are increasingly available, the use of analytics for systematic student performance evaluation may still be limited. In many institutions, conventional approaches to evaluation continue to play an important role, while the use of data generated from digital learning platforms may not yet be fully integrated into routine evaluation practices. In addition, inadequate training for lecturers, poor digital infrastructure, unstable internet connectivity, limited institutional support, and the absence of clear policies may create difficulties in adopting and effectively using e-learning analytics. These conditions may also limit the extent to which lecturers and students experience the potential benefits of analytics for monitoring learning progress and improving educational outcomes. The challenges associated with adoption therefore make it necessary to examine not only the extent of adoption but also the perceived benefits, challenges, and strategies for improving the use of e-learning analytics in universities.

If this situation continues, universities may not fully benefit from the information generated through students' digital learning activities. Students who experience learning difficulties may not be identified early enough for appropriate academic support, while lecturers may have fewer timely data

to guide instructional decisions and evaluation. The continued dependence on conventional evaluation approaches without adequate integration of analytics may also limit opportunities for more responsive and evidence-based assessment practices. Ultimately, if universities in North Central Nigeria do not adequately address the factors affecting the adoption of e-learning analytics, Business Education programmes may find it difficult to fully utilize data-driven approaches for improving student performance and preparing graduates for the demands of a digitally driven labour market. It is therefore necessary to determine the extent to which e-learning analytics has been adopted, examine its perceived benefits, identify the challenges affecting its adoption, and determine strategies for improving its adoption in Business Education programmes in North Central Nigerian universities.

Purpose of the Study

The main purpose of the study is to examine the adoption of e-learning analytics for evaluating student performance in Business Education programmes in North Central Nigerian Universities. Specifically, the study sought to:

1. determine the extent of adoption of e-learning analytics in evaluating student performance in business education programmes.
2. examine the perceived benefits of e-learning analytics among lecturers and students.
3. identify challenges affecting adoption in North Central Nigerian universities.
4. determine the strategies for improving the adoption of e-learning analytics in North Central Nigerian universities?

Research Question

The following research questions guided the study:

1. What is the extent of adoption of e-learning analytics in evaluating student performance in business education programmes?
2. What are the perceived benefits of e-learning analytics among lecturers and students?
3. What are the challenges affecting adoption in North Central Nigerian universities?
4. What are the strategies for improving the adoption of e-learning analytics in North Central Nigerian universities?

Hypotheses

H01 There is no significant difference between federal and state universities in the adoption of e-learning analytics for evaluating student performance.

Methodology

The study adopted a descriptive survey research design. The area of the study is North Central Nigeria, chosen because universities in this region are still lagging in the adoption of technology-driven systems for evaluating student performance. This makes it a suitable context for investigating the adoption of e-learning analytics in business education programmes. The population of the study consisted of 292 respondents, made up of 86 lecturers of business education and 206 final-year (400 level) business education students across four public universities in North Central Nigeria that offer business education programmes. These universities included the Federal University of Education, Kotogora, Niger State; Benue State University, Makurdi; Kwara State University, Malete; and the Federal University of Lafia. Out of this population, a sample of 169 respondents was determined using Yamane's formula at a 95% confidence level and 5% margin of error. The sample size is 169 respondents. The sample comprised 50 lecturers and 119 students proportionately drawn from the four universities to ensure adequate representation of both categories of respondents.

The instrument for data collection was a structured questionnaire titled "Adoption of E-Learning Analytics for Evaluating Student Performance in Business Education Programmes in North Central Nigerian Universities" (AELEAESPBENNU), which was developed by the researcher. The instrument was divided into two sections: the first section elicited demographic information of respondents, while the second section contained items developed to address the specific purposes of the study. The items were structured on a four-point scale of Very High Extent (VHE = 4), High Extent (HE = 3), Low Extent (LE = 2) and Very Low Extent (VLE = 1) for the research question 1 and Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1) for research question 2,3 and 4. The face and content validity of the instrument were established by three experts, two from the Department of Business Education and one from the Department of Educational Technology, University of Nigeria, Nsukka. Their corrections and suggestions were incorporated before the final draft was produced. To ensure reliability, the instrument was pilot-tested on 20 respondents from a university outside the study area. The reliability coefficient was determined using Cronbach's Alpha and yielded a value of 0.83, which was considered high enough for the study. The researcher, with the help of research assistants, administered the questionnaires directly to the respondents in their respective universities. Follow-ups were made to ensure maximum retrieval. Out of the 169 questionnaires distributed, 162 were duly completed and returned, representing a 95.8% return rate. Data collected were analyzed using mean and standard deviation to answer the research questions, while t-test were used to test the null hypotheses at 0.05 level of significance. The Statistical Package for the Social Sciences (SPSS version 26.0) was used for the analysis. A criterion mean of 2.50 was used as the decision rule for interpreting the items. For hypotheses testing, where the calculated p-value was greater than 0.05, the null hypothesis was accepted, but if the p-value was less than or equal to 0.05, the null hypothesis was rejected.

Results

The results for this study are presented based on the research questions raised to guide the study.

Research Question 1

What is the extent of adoption of e-learning analytics for evaluating student performance in business education programmes in North Central Nigerian universities?

Table 1: Mean rating and standard deviation of the responses of lecturers on the extent of adoption of e-learning analytics for evaluating student performance in business education programmes

S/N	Items	$\overline{X}^1$	SD¹	$\overline{X}^2$	SD²	Remark
1	Use of LMS-embedded reporting modules (e.g., Moodle, Canvas, Blackboard) to track student participation and engagement	2.14	0.81	2.08	0.76	Low Extent
2	Use of dashboard visualisations to monitor students' progress across courses	2.28	0.74	2.12	0.71	Low Extent
3	Use of early-warning systems to identify at-risk students	2.03	0.78	1.97	0.70	Very Low Extent
4	Use of learning path visualisers to track student progression in business education courses	2.21	0.75	2.18	0.69	Low Extent
5	Use of predictive models (e.g., grade predictions, risk forecasts) to inform interventions	1.98	0.83	1.91	0.72	Very Low Extent
6	Analysis of data from quizzes, assignments, and exams using digital tools	2.32	0.77	2.25	0.73	Low Extent
7	Use of log-in frequency and time-on-task data to evaluate student commitment	2.20	0.74	2.11	0.71	Low Extent
8	Tracking student interaction in discussion forums and online collaboration platforms	2.27	0.79	2.16	0.75	Low Extent
9	Use of digital analytics to adjust teaching methods in business education programmes	2.29	0.72	2.20	0.68	Low Extent
10	Sharing analytic insights with students to improve their learning outcomes	2.18	0.73	2.06	0.70	Low Extent

Key: $\overline{X}1$ = Mean of the lecturers $\overline{X}2$ = Mean of the students SD = Standard Deviation

The data presented in Table 1 show that both lecturers and students reported a low extent of use of e-learning analytics in evaluating student performance in business education programmes. The mean ratings for lecturers ranged from 1.98 to 2.32, while those of students ranged from 1.91 to 2.25, all of which are below the cut-off point of 2.50. This indicates that items 1–10 were not widely adopted in practice.

The standard deviation values ranged from 0.68 to 0.83, showing that the responses of both groups were fairly consistent. Overall, the findings imply that while lecturers and students are aware of the existence of e-learning analytics tools such as LMS reporting, dashboards, and predictive models, these tools are rarely integrated into teaching and evaluation processes. The very low mean scores recorded for early-warning systems and predictive models suggest that advanced applications of analytics are almost absent in North Central Nigerian universities.

Research Question 2

What are the perceived benefits of e-learning analytics among lecturers and students?

Table 2: Mean rating and standard deviation of the responses of lecturers and students on the perceived benefits of e-learning analytics in business education programmes

S/N	Items	$\overline{X}^1$	SD[1]	$\overline{X}^2$	SD[2]	Remark
11	E-learning analytics helps lecturers identify at-risk students early for timely intervention	3.42	0.61	3.38	0.66	Agreed
12	Analytics improves the accuracy and objectivity of evaluating student performance	3.51	0.59	3.47	0.63	Agreed
13	E-learning analytics supports personalised learning by tracking individual student progress	3.33	0.64	3.28	0.68	Agreed
14	Analytics provides data-driven insights that help lecturers adjust teaching strategies	3.46	0.60	3.39	0.65	Agreed
15	Students benefit from real-time feedback that can improve their learning outcomes	3.55	0.57	3.49	0.62	Agreed
16	E-learning analytics enhances transparency in student assessment and grading	3.28	0.65	3.22	0.70	Agreed
17	Analytics encourages students' self-regulated learning by showing progress dashboards	3.39	0.62	3.33	0.67	Agreed
18	Adoption of e-learning analytics promotes institutional efficiency and accountability	3.48	0.60	3.44	0.64	Agreed
19	E-learning analytics helps universities benchmark performance against global standards	3.31	0.66	3.25	0.71	Agreed
20	Overall, analytics contributes to improved student academic achievement and programme quality	3.53	0.58	3.50	0.63	Agreed

Key: $\overline{X}1$ = Mean of the lecturers $\overline{X}2$ = Mean of the students SD = Standard Deviation

The results in Table 2 show that both lecturers and students agreed on the perceived benefits of e-learning analytics in business education programmes. The mean values for lecturers ranged from 3.28 to 3.55, while those of students ranged from 3.22 to 3.50, all of which are above the cut-off point of 2.50. This indicates that the respondents strongly believe in the positive impact of e-learning analytics if fully adopted. The standard deviation values ranged from 0.57 to 0.71, suggesting that responses were relatively close to each other, reflecting a high level of consistency among participants. The most highly rated perceived benefits were real-time feedback for students and overall contribution to improved student achievement and programme quality, while the least emphasised were enhancing transparency in grading and benchmarking performance against global standards. Overall, these findings imply that lecturers and students in North Central Nigerian universities acknowledge the potential benefits of e-learning analytics, even though full utilisation of these benefits is yet to be realised.

Research Question 3

What are the challenges affecting adoption of e-learning analytics in North Central Nigerian universities?

Table 3: Mean rating and standard deviation of the responses of lecturers and students on the challenges affecting adoption of e-learning analytic

S/N	Items	$\overline{X}_1$	SD¹	$\overline{X}_2$	SD²	Remark
21	Inadequate ICT infrastructure (poor internet, unreliable electricity, limited hardware) hinders adoption	3.61	0.58	3.55	0.64	Agreed
22	High cost of acquiring and maintaining e-learning analytics tools is a major challenge	3.48	0.63	3.42	0.67	Agreed
23	Limited technical expertise among lecturers and students reduces effective utilisation	3.39	0.65	3.35	0.70	Agreed
24	Lack of adequate training and capacity-building opportunities for staff affects adoption	3.46	0.61	3.41	0.66	Agreed
25	Poor institutional support and weak policies on digital technology integration	3.33	0.67	3.29	0.71	Agreed
26	Resistance to change among lecturers and students limits acceptance of new technologies	3.28	0.69	3.22	0.72	Agreed
27	Concerns about data privacy and security discourage adoption of analytics	3.35	0.64	3.30	0.68	Agreed
28	Inconsistent power supply and unstable digital networks affect smooth implementation	3.53	0.59	3.48	0.63	Agreed
29	Lack of funding from government and management weakens sustainability	3.42	0.62	3.36	0.66	Agreed
30	Overdependence on manual methods of evaluation discourages transition to analytics	3.31	0.68	3.25	0.70	Agreed

Key: $\overline{X}1$ = Mean of the lecturers $\overline{X}2$ = Mean of the students SD = Standard Deviation

The results in Table 3 reveal that both lecturers and students agreed that multiple challenges affect the adoption of e-learning analytics in North Central Nigerian universities. The mean values for lecturers ranged from 3.28 to 3.61, while those of students ranged from 3.22 to 3.55, all above the benchmark of 2.50. This indicates that the challenges listed are real and widely experienced across the universities studied. The standard deviation values (0.58 – 0.72) show that responses were clustered closely, meaning there was a strong consensus among participants. The most highly rated challenges were inadequate ICT infrastructure and unstable electricity/digital networks, while the least emphasised were resistance to change and overdependence on manual methods. Overall, the findings suggest that unless these challenges are addressed, adoption of e-learning analytics in North Central Nigerian universities may remain low, limiting opportunities for data-driven improvement in student performance and teaching quality.

Research Question 4

What are the strategies for improving the adoption of e-learning analytics in North Central Nigerian universities?

Table 4: Mean rating and standard deviation of the responses of lecturers and students on the strategies for improving adoption of e-learning analytics

S/N	Items	$\overline{X}_1$	SD¹	$\overline{X}_2$	SD²	Remark
31	Provision of reliable ICT infrastructure (broadband internet, modern devices, and stable electricity) will improve adoption	3.72	0.57	3.68	0.61	Agreed
32	Regular training and capacity building for lecturers and students will enhance effective use of analytics	3.61	0.62	3.55	0.65	Agreed
33	Adequate funding from government and university management should be allocated to sustain adoption	3.58	0.64	3.49	0.69	Agreed
34	Formulation of clear institutional policies on technology and analytics integration will promote usage	3.47	0.66	3.42	0.71	Agreed
35	Encouraging collaboration between ICT experts and lecturers will improve implementation	3.41	0.65	3.36	0.70	Agreed
36	Introducing incentives and recognition for lecturers who adopt digital teaching strategies will increase motivation	3.33	0.68	3.29	0.72	Agreed
37	Establishing data privacy and security frameworks will build confidence among users	3.46	0.61	3.39	0.66	Agreed
38	Adoption of blended learning models (face-to-face and digital integration) will create a smoother transition	3.29	0.70	3.25	0.74	Agreed

S/N	Items	$\overline{X}_1$	SD[1]	$\overline{X}_2$	SD[2]	Remark
39	Setting up technical support units within universities will provide timely assistance to users	3.44	0.63	3.38	0.67	Agreed
40	Creating awareness on the benefits of analytics for student performance and teaching effectiveness will promote positive attitudes	3.39	0.66	3.31	0.71	Agreed

Key: $\overline{X}1$ = Mean of the lecturers $\overline{X}2$ = Mean of the students SD = Standard Deviation

The results in Table 4 indicate that both lecturers and students strongly agreed on several strategies to improve the adoption of e-learning analytics. The mean scores for lecturers ranged from 3.29 to 3.72, while those of students ranged from 3.25 to 3.68, all above the cut-off mark of 2.50. This demonstrates a consensus that these strategies are feasible and necessary for advancing adoption. The most highly rated strategies were the provision of reliable ICT infrastructure and regular training for lecturers and students, showing that participants believe addressing infrastructure and capacity gaps is fundamental. The least emphasised strategies, although still agreed upon, were incentives for lecturers and adopting blended learning models, suggesting they are seen as secondary but still supportive measures. Overall, the findings highlight that improving infrastructure, training, funding, and policy frameworks are essential drivers for strengthening the adoption of e-learning analytics in North Central Nigerian universities.

Discussion of Findings

The findings of this study revealed that the extent of adoption of e-learning analytics for evaluating student performance in business education programmes in North Central Nigerian universities is low. Both lecturers and students reported mean scores below the cut-off point of 2.50, indicating minimal use of tools such as LMS-embedded reporting, dashboard visualisations, and learning-path visualisers. Particularly, advanced applications like predictive models and early-warning systems were rated at a very low extent, highlighting that universities have yet to integrate more sophisticated analytics functions into their teaching and assessment practices. This result aligns with previous studies which report that the adoption of analytics in many developing contexts remains limited due to infrastructural and institutional challenges (Adukaite et al., 2020; Ifinedo, 2021). The consistency in responses between lecturers and students further suggests that the problem is systemic rather than individual.

Despite this low level of adoption, the results from Research Question 2 showed that both lecturers and students strongly perceive significant benefits of e-learning analytics. Items such as improved tracking of student performance, early identification of at-risk students, and enhanced decision-making were all rated positively, with mean scores between 2.98 and 3.75. This implies that stakeholders are not unaware of the transformative potential of e-learning analytics; rather, they recognize its role in improving instructional effectiveness, supporting student learning, and enhancing institutional competitiveness. These findings resonate with the conclusions of Papamitsiou and Economides (2019), who argued that the value of analytics lies in its ability to turn raw data into actionable insights for learning improvement. Thus, the gap is not in awareness but in practical implementation.

When the discussion is extended to Research Question 3, the challenges limiting adoption become clearer. Respondents identified critical issues such as poor ICT infrastructure, lack of technical skills among staff, insufficient institutional policies, and limited funding as major barriers. These results confirm earlier assertions by Oguguo et al. (2021) and Oye et al. (2020) that the absence of enabling environments in Nigerian universities continues to constrain the full deployment of digital innovations in education. Interestingly, the standard deviation values in this section were relatively small, suggesting strong agreement among respondents about these barriers. Without addressing these

structural and human-capacity challenges, universities will continue to struggle with integrating e-learning analytics into evaluation practices.

Findings from Research Question 4 provided practical strategies for enhancing adoption. Both lecturers and students agreed that capacity-building workshops, improved funding for digital infrastructure, and the establishment of clear institutional frameworks are necessary. Furthermore, respondents supported the idea of integrating analytics training into professional development programmes, which would build the digital literacy of academic staff. These results correspond with the recommendations of Ifijeh and Yusuf (2020), who emphasised that sustained investment in human and technological resources is key to mainstreaming digital tools in higher education. This suggests that although the current adoption of analytics is low, there is optimism among stakeholders, provided supportive strategies are effectively implemented.

Conclusion

The study revealed that the adoption of e-learning analytics for evaluating student performance in business education programmes in North Central Nigerian universities is generally low. While lecturers and students recognize its potential benefits for improving teaching and learning, limited infrastructure, inadequate training, and weak institutional support hinder its use. To remain competitive and enhance educational outcomes, universities in the region must move beyond traditional evaluation methods and embrace data-driven approaches that e-learning analytics provides.

Recommendations

1. Universities in North Central Nigeria should provide regular training workshops for lecturers and students on the use of e-learning analytics tools. This can be achieved by partnering with ICT experts and professional bodies to build capacity and confidence in applying analytics for teaching and evaluation.
2. Institutional management should invest in reliable digital infrastructure such as stable internet, functional LMS platforms, and updated computer laboratories. This can be achieved by allocating a portion of annual budgets specifically for ICT development and seeking government or donor support.
3. Lecturers should integrate basic e-learning analytics features, such as LMS reporting and dashboard visualisations, into their daily teaching and evaluation practices. This can be achieved through consistent use of built-in LMS tools to track participation, monitor progress, and provide timely feedback.
4. Universities should adopt policies that mandate the gradual implementation of analytics in evaluation processes. This can be achieved by embedding analytics into quality assurance frameworks and making it part of institutional teaching standards.
5. Students should be sensitized on how e-learning analytics can improve their learning outcomes. This can be achieved by sharing simple dashboard insights with students to help them track their performance and take corrective actions early.

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