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Sustainability of Online Teaching-Learning Platforms in Nigerian Tertiary Institutions: Assessing Lecturers' Attitude, Readiness, and Teaching Styles

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Abstract

This study examines the attitudes and preparedness of lecturers regarding their tactics and teaching styles for the long-term viability and sustainability of online education platforms in public higher education institutions in Southwest Nigeria. Underpinned by the Connectivism Theory of Learning (CTL) and using the survey research design, and a multistage sampling procedure, 496 lecturers were chosen from nine institutions in the region. Descriptive and inferential statistics were used to analyze the data, which were collected using the Online Teaching-Learning Platform Sustainability Questionnaire (OTLPSQ)(α=0.87). The lecturers' attitudes regarding online teaching-learning platforms were found to be largely positive (M=2.92), with a high level of readiness for online teaching (71%). Additionally, the study found that online learning environments greatly accommodate students' learning preferences (M=2.94); the sustainability of these platforms as perceived by lecturers is significantly impacted by students' attitudes (r=0.605, p<0.05) and readiness (r=0.762, p<0.05). Lack of in-person engagement, technical malfunctioning, time restraints, diversions, poor feedback, and inadequate ICT infrastructure were some of the obstacles perceived to be affecting these platforms' sustainability. The study recommends that improving lecturers' digital competencies, guaranteeing consistent internet access, incorporating hybrid learning models, and offering strong institutional support for online learning platforms would ensure the sustainability of online teaching-learning platforms at the institutions. These results offer empirical insights into actionable strategies for maintaining digital education in Nigeria, highlighting the necessity of student-centered pedagogical techniques, infrastructure investment and upgrades, and institutional policies that facilitate blended learning.

Keywords: Lecturers' Attitudes, Lecturers' Readiness, Online Teaching-Learning Platforms, Sustainability, Teaching Styles.

Introduction

The traditional classroom setting has been greatly impacted by a lot of evolutions, such as the swift encroachment of online teaching-learning technology which was necessitated by the COVID-19 pandemic, particularly in tertiary institutions in developing countries such as Nigeria (1). The incorporation of online teaching and learning platforms into higher education has become a crucial component of instructional delivery globally, presenting both new opportunities and problems for educators and students alike (2). The term "online teaching-learning platforms" refer to electronic devices and systems that are used to support learning in a virtual setting (3). Various educational software applications, interactive whiteboards, video conferencing devices, and learning management systems (LMS) are examples of these platforms (4, 5). These platforms improve accessibility, flexibility, and the overall quality of education in higher education. For this study, the term sustainability is referred to as pedagogical efficacy, long-term institutional adoption, or lecturers' on-going engagement with respect to online teaching and learning platforms. However, the successful implementation and sustainability of them depend heavily on several social, pedagogical, and environmental variables (6), with lecturers as major players in the process. The attitude and readiness of lecturers towards these platforms are critical determinants of their effective adoption and long-term viability. Lecturers' attitude towards online teaching-learning platforms represents a complex interaction among their perceptions, values, belief,

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and experiences (7). While some lecturers may perceive the platforms as valuable tools that can enhance their teaching methodologies and student engagement, others could view them as challenging. More so, additional factors, including past technological experience, perceived usability, and the perceived advantages of online platforms in accomplishing learning goals, may influence these attitudes (8). Lecturers' attitudes toward online teaching significantly influence the adoption and sustainability of digital learning platforms (9). A positive disposition among faculty members can lead to more effective integration of technology in teaching practices (10). Yet, in the case of Nigerian lecturers, there is a degree of hesitancy or poor attitude of lecturers towards the effectiveness of digital instruction (11). Lecturers' readiness in using online teaching-learning platforms entails their technical expertise, pedagogical flexibility, psychological receptiveness to using these platforms, and positive attitude toward devoting time and energy to learning the devices and their features (12). Lecturers who are well-prepared and self-assured to navigate online platforms are most likely to effectively incorporate them into their teaching experiences and practices. On the contrary, those who may be unprepared or overwhelmed may struggle to adopt and maximise the potential of these emerging technologies. The need for additional professional training of Nigerian instructors for their enhanced readiness and effectiveness in online teaching and learning platforms has been debated over time (13).

The extent to which online teaching-learning platforms adapt to the teaching styles of lecturers is another crucial aspect of their sustainability. Ideally, these platforms should be flexible enough to accommodate diverse teaching methodologies and subject-specific requirements (14). The ability of lecturers to customise and tailor these platforms to their unique teaching strategies can potentially impact their long-term adoption (2). Online teaching-learning platforms that seem inflexible or incompatible with existing teaching styles may encounter resistance and limited use from users, especially lecturers, which may in turn affect their sustainability (5). The ability of e-teaching platforms to adapt to different teaching philosophies may have a significant impact on their effectiveness (15). The misalignment regarding these platforms may have an impact on lecturers' readiness or inclination to use online teaching platforms, as well as the long-term sustainability of such platforms.

Positive attitudes and high levels of readiness, in practice, make the transition to online teaching and learning easier, encourage regular use of digital technologies, and improve students' involvement (12, 16). The effectiveness and sustainability of online teaching-learning platforms, however, can be impacted by unfavourable attitudes and a lack of readiness, which can lead to their underuse and poor management (17). Lecturers who view online teaching positively are more likely to explore the features of the tools and software, seek professional development opportunities, and encourage their colleagues and students to embrace these technologies (16). Conversely, negative attitudes can result in minimal or ineffective use of the platforms, potentially undermining their long-term sustainability (18). Similarly, well-readied lecturers can act as advocates for these new technologies by showcasing their advantages and persuading their peers to use them. This can result in a more successful rollout, remarkable student academic performance, and more institutional support for online teaching and learning projects (12, 19).

Since educational technology and adoption are an emerging phenomenon in Nigeria, there is a need to inquire into the fairly new adoption of online teaching and learning platforms in her ivory towers. More importantly is the need to investigate the perceptions, attitudes, readiness, and other related components that militate against the sustainability of these platforms, amongst others. Therefore, the purpose of this current study is to assess the perceptions of lecturers with respect to online teaching and learning platforms in southwest Nigerian tertiary institutions, concentrating on what their attitudes are towards these platforms, how ready they are to adopt these platforms for teaching, and their teaching styles with these platforms. Moreover, the study examined the factors that militate against the sustainability of these platforms as well as the strategies that could be adopted to ensure their continued sustainability in the sampled universities.

Problem Statement

It is a fact that technology, irrespective of fields, now rules the world. For the education sector, for instance, higher education institutions now adopt and integrate technologies for educational purposes. This integration represents a revolutionary shift to a more accessible, flexible, and affordable education system (20). Nevertheless, there appear to be some ambiguities, as their sustainability and successful integration into classroom teaching and learning seem to be begging for attention from scholars, educators, and policymakers. The Nigerian government, for instance, in collaboration with various educational institutions in the country, initiated projects to introduce and integrate these platforms into the traditional educational system, resulting in a pedagogical shift. The switch is quite a good decision; however, it has not been without hurdles, necessitating a comprehensive assessment of its sustainability. Additionally, studies in Nigeria on the sustainability of online teaching-learning platforms, and lecturers' perceptions, attitudes, and readiness with regards to these platforms, how these platforms accommodate their teaching styles, the factors that militate against their sustainability, as well as strategies for ensuring their long-term sustainability within same are sparse and inconclusive (20-24). Essentially, this study provides a triadic focus on lecturers' attitudes, readiness, and teaching styles in online teaching and learning platforms, with emphasis on its sustainability, especially in under-resourced tertiary institutions in Southwest of Nigeria. To fill this gap in the literature, this study, therefore, assessed the sustainability of online teaching-learning platforms in Southwest Nigerian tertiary institutions, concentrating on the attitudes, readiness, and teaching styles of lecturers in the use of these platforms.

This study provides answers to the following questions: What are the attitudes of lecturers toward online teaching-learning platforms in the sampled universities? What is the lecturers' level of readiness in using online teaching-learning platforms? To what extent do online teaching-learning platforms adapt to lecturers' teaching styles? To what extent do lecturers' attitudes toward online teaching-learning platforms affect sustainability? To what extent do lecturers' readiness for online teaching-learning platforms impact sustainability? What are the factors that militate against the sustainability of online teaching-learning platforms as perceived by lecturers from higher institutions? And what are the perceived strategies to adopt in ameliorating the barriers hindering these platforms' sustainability?

Online Teaching and Learning

A remote activity that uses digital teaching and learning devices and gadgets is referred to as online teaching and learning (25). Online teaching-learning is an interactive and electronic learning environment that is suitable for both instructors and students (26). It has also been termed as the practice of leveraging contemporary communication technology to facilitate beneficial connections between educators and learners to advance educational activities (27). Online teaching and learning appear to have greater flexibility, availability, and accessibility than traditional classroom education. As a result, it is gaining popularity and showing promise with several benefits, including significant instructional resources and high learning satisfaction (12).

There is still a digital divide between developed and underdeveloped countries (28, 29). Because of strong infrastructure, highly qualified labour, encouraging laws, and emphasis on creating and developing digital technology, developed nations typically have higher levels of digital maturity. Developing nations, on the other hand, frequently deal with issues including inadequate digital infrastructure and access, a lack of skilled human resources, and a larger reliance on utilising rather than producing digital technologies. Developed nations are more advanced in digital innovation and adoption (30). Higher levels of digital maturity are typically seen in developed nations, as evidenced by their sophisticated digital infrastructure, broad use of digital technology in daily life, industry, and government, and widespread internet access (31, 32).

Developing countries are concentrating on creating fundamental components like internet connectivity, digital literacy, and supportive governance to enable and foster their digital transformation. These nations now place a high priority on advanced digital skills training, cyber security and data privacy regulations, innovation projects like artificial intelligence (AI) and the Internet of Things (IoT), preserving digital

leadership through the expansion of advanced digital infrastructure like 5G and 6G, and policy emphasis on digital skills development, competition, and regulation (32, 33). Similarly, developing nations prioritise the development of foundational digital ecosystems and the expansion of basic digital access (34). Infrastructure development in rural and underserved areas, the affordability of internet access and basic digital devices, digital literacy campaigns for populations with limited prior access, the development of meaningful, locally relevant digital content and services, and policy emphasis on spectrum allocation, are their top priorities (35, 36). The present study is being conducted in Nigeria, a country that prioritises mobile broadband development over advanced tech investments to bridge the basic digital gap.

Lecturers' Attitudes toward Online Teaching-Learning Platforms

Attitude has been defined as the predisposition of an individual towards a particular person, event, or object (28, 29). Studies indicate that lecturers are positively disposed to online teaching-learning platforms, as it is an effective tool for improving the delivery of instruction (30-32). Several other studies indicate positive attitudes of lecturers toward online education. For instance, the study of (33), which examined the attitudes of lecturers at selected colleges of education in Nigeria toward the Virtual Classrooms (VCs), showed that they had a positive attitudinal disposition toward VCs. Past research has investigated teachers' attitudes with respect to online instruction and found that teachers had positive attitudes toward online teaching (34). The Findings of another study has also indicated positive attitudes amongst History lecturers toward online education (35).

Readiness of Lecturers for Online Teaching and Learning Platforms

In a study of instructors' attitudes and readiness for online learning, it was discovered that teachers had a generally positive attitude toward online instruction and a moderate level of readiness in its adoption (36). Another previous study assessed instructors' readiness for online learning in Nigerian universities during the COVID-19 pandemic (37). Findings showed that Nigerian universities were not ready for online teaching and learning, as the necessary tools for implementation were not easily accessible. Teachers' readiness toward instructing and studying online was examined by a study (38). Findings show that many of these teachers were not really ready for such instructional mode. Still, another related study investigated the readiness of teachers in adopting online teaching platforms revealed a moderate readiness level (17).

Adaptation of Online Teaching-Learning Platforms to Lecturers' Teaching Styles

Online teaching-learning platforms and their relevance in higher education have gained significant usage and advocacy, particularly following the compulsory migration to online technology orchestrated by the COVID-19 pandemic (37). However, its effective implementation depends not only on technological and structural provisions but also on how well it aligns with lecturers' teaching styles (39). The degree to which online teaching-learning platforms accommodate lecturers' distinct teaching styles determines how effective they are (38). Instructors who emphasize student autonomy, interaction, and instant feedback found it easier to adjust to online learning environments (40). On the other hand, didactic lecturers frequently voiced their displeasure with online platforms' inability to replicate in-person class dynamics (41). Online teaching-learning platforms that allow instructors to customize communication tools, assessment modalities, and content delivery techniques are more likely to satisfy a range of pedagogical needs (42).

Impact of Lecturers' Attitude and Readiness on Sustainability of Online Teaching-Learning Platforms

Sustainability refers to the capacity of institutions to maintain and improve the usage of online teaching and learning platforms over time, ensuring accessibility, engagement, and educational standards. Sustainable online teaching and learning depend on technological, pedagogical, institutional, and human factors (43). It encompasses curriculum adaptability, digital literacy, and the self-assurance to use online resources (44). University-wide research found that instructors who thought online instruction was adaptable and successful showed greater levels of involvement, which leads to a good impact on sustainability (20, 41), while negative attitudes

hamper its sustainability (45). Many lecturers in Nigeria are not fully ready, which affect and jeopardize the viability of these online teaching and learning platforms (26).

Factors Determining the Sustainability of online Teaching and Learning Platforms

The sustainability of online teaching and learning platforms is affected by several factors. The online teaching-learning process in developing nations' higher education institutions, including Nigeria, has several militating factors. Findings of the study showed that distractions and reduced focus, an overwhelming workload, internet and technology problems, poor ICT skills, poor network infrastructure, limited access to learning materials, low student attendance, disobedient students, and a lack of peer and instructor support were the most common militating factors (46). Research show that students' sense of isolation, unclear learning tasks, irrelevant instructional materials and resources, technical issues, limited internet access, bandwidth issues, and instructors' unavailability at discussion forums, lack of computer skills, staff shortages, and lack of commitment from both lecturers, lack of funding, irregular power supply; inadequately trained human resources; lack of smartphones, unsatisfactory student-computer ratio, high software costs, high internet broadband costs, poor community literacy, technophobia, and system failure all pose risks to the successful implementation and long-term viability of online teaching-learning platforms (36, 47-50).

Strategies for Online Teaching and Teaching Platforms' Sustainability

Online teaching-learning platforms' sustainability must be ensured by universities. To become comfortable with using technology in the classroom, teachers must receive training (51). Online education can be made sustainable via better assessment, internet connectivity, interactive content, and easily accessible resources (48). Strengthening training and technical support, as well as upgrading electricity and internet infrastructure, are essential tactics for sustainable online education (47). It could also entail implementing cyber security and data protection measures, encouraging stakeholder participation and engagement, carrying out capacity-building and training initiatives, developing top-down leadership and political commitment, enacting policy and regulatory reforms, and forming public-private partnerships to mobilize resources (52).

Theoretical Framework

The Connectivism Theory of Learning

Underpinning this research is the Connectivism Theory of Learning (CTL) (53). The theory states that knowledge is stimulated by the process of connecting or relating information to a learning community, which is the first step in the learning process. A community is a collection of related ideas that allow for active learning, sharing, cooperation, discussion, engagement, and brainstorming (53). Internet delivery systems are particularly suited to educational philosophies that prioritise learner-centeredness, flexibility, autonomy, and diversity, such as constructivist and connectivist philosophies (54). The learning processes made possible by these online teaching and learning platforms are dynamic, interactive, and networked. By promoting accessibility, flexibility, and self-directed learning, these educational philosophies assist reduce the use of physical resources (such as printed materials and transportation), which improves the knowledge of sustainability and related competences (55).

Students can transition from a tutor-controlled, directed learning environment to a non-directed one where they can create knowledge by interacting with and optimizing networks outside of the conventional, in-person setting. For these platforms to be sustainable, the users (lecturers and students) must have a positive attitude towards them, be ready to use them for their teaching and learning concerns and adopt strategies that would ensure their overall sustainability. It is through these theoretical lenses that this current study was conceived.

Methodology

This study adopts the survey research design. This design is a fundamental and methodical technique of data collection from groups or individuals through well-structured questionnaires or interviews (56). It is an approach that allows researchers to systematically gather information on people's attitudes, actions, opinions, and beliefs, therefore revealing valuable insights into a research interest.

Population, Sampling Techniques, and Sample

All lecturers in Southwest Nigerian tertiary institutions made up this study's population. The multistage sampling approach was used for the sampling process. The southwest region of Nigeria is made up of the following six states: Lagos, Ekiti, Ondo, Osun, Ogun, and Oyo. The simple random sampling approach was used to choose three States (Ekiti, Ondo, and Osun) from the six States. The purposive sampling technique was used to select three public tertiary institutions in the selected States. Also, the simple random sampling technique was used to select four faculties and Departments from the selected institutions. Since the study was wholly voluntary, a total of 496 lecturers who filled out the instruments constituted the sample of the study.

Instruments

Data for this study were gathered using the Online Teaching-Learning Platform Sustainability Questionnaire (OTLPSQ), which was adapted from validated tools in the published literature (16, 48, 50, 52, 56-58). It is divided into seven sections, each including items that addressed the research objectives. The questionnaire's first section asked about the demographics of the targeted lecturers, including their age, gender, academic year, and years of experience in using online teaching and learning platforms. It also consists of an item "which online teaching-learning platforms do/does your school/institution use? The second segment measured lecturers' attitude towards online teaching-learning platforms with response ranging from "strongly agree", "agree", "disagree", "strongly disagree" which contained fourteen items was adapted from previous study (56). The third segment featured the lecturers' readiness towards online teaching-learning platforms with responses ranging from "very much like me", "like me", "rarely like me", "unlike me", and it contained nine items, was adapted from previous study (57). The scale measured lecturers' readiness with respect to psychological preparedness.

The fourth section, which included thirteen items that were modified from previous research, assessed how well online instruction and learning might adapt to lecturers' teaching styles (58). Responses ranged from "very much like me," "like me," "rarely like me," and "unlike me." In the fifth section, the obstacles of online teaching-learning platforms were examined using the words "strongly agree," "agree," "disagree," and "strongly disagree." Thirteen items that were taken from the previous published research were used to measure the construct (48, 50). Using "strongly agree," "agree," "disagree," and "strongly disagree," the sixth segment assessed ways for overcoming the obstacles of online teaching-learning platforms. It included twelve items that were derived from the works of past researchers (48, 52).

The questionnaire's seventh section, which used the responses "strongly agree," "agree," "disagree," and "strongly disagree," focused on the sustainability of online teaching-learning platforms. Eleven items were modified from previous research (16). Four specialists in Educational Tests and Measurement from one of the sampled institutions evaluated the face and content validities of this instrument. The final version of the data collection tool was pilot tested on 67 students who were not part of the actual sample. The Cronbach alpha method was used to determine the reliability of the questionnaire, which yielded an index of 0.87.

Method of Data Collection

To facilitate the data gathering process, the researchers hired 6 research assistants, two assigned to each university. After the respondents gave their consent to participate in the study, printed questionnaires (600 copies) were given to them in person. However, only 496 of them were returned and fully filled out. Prior to their actual involvement, respondents were required to complete and sign a consent and voluntary participation form on ethical grounds.

Data Analysis Method

The data of this study were analysed using descriptive (frequency counts, percentages, mean, and standard deviation) and inferential statistics (correlational analysis) at a 5% level of significance.

Results

The results of the analyses of data retrieved from the responses are in accordance with the aims and objectives of the study. Table 1 shows the demographic characteristics of the sampled lecturers. As regards gender, 224 (45.2%) were males, and 272 (54.8%) were females. On age, 88 (17.7%) were between the ages of 20 and 40, 41 to 60 years old accounted for the biggest percentage

of respondents, which was 344 (69.4%), while the age group of 61 years and older accounted for the smallest percentage, which was 62 (12.9%). On years of experience, 296 (59.7%) had less than 10 years of experience, 112 (22.6%) had 11 to 20 years of experience, while 88 (17.7%) had 21 years and above working experience. In terms of online teaching experience in years, 360 (72.8%) had 1 to 5 years of experience, 112 (22.6%) had 6 to 10 years online teaching experience, 16 (3.2%) had 11 to 15 years, while 8 (1.6%) had above 16 years of experience in online teaching. In terms of online teaching-learning platforms used, the most used was What Sapp, with 160 (32.3%), followed by Telegram, 144 (29.0%), amidst others.

Table 1: Demographic Characteristics of Respondents (N = 496)

Characteristics	Frequency	Percentage (%)
Gender		
Male	224	45.2
Female	272	54.8
Age (years)		
20-40 years	88	17.7
21-60 years	344	69.4
61 years and above	64	12.9
Years of working experience		
1-10 years	296	59.7
11-20 years	112	22.6
21 years and above	88	17.7
E-learning years of experience		
1-5 years	360	72.8
6-10 years	112	22.6
11-15 years	16	3.2
16 years and above	8	1.6
Online Platform used		
WhatsApp	160	32.3
Multiple platform	144	29.0
Telegram	80	16.1
Google Classroom	56	11.3
Google Meet	16	3.2
Others	16	3.2
None	16	3.2
Zoom	8	1.6
Youtube	0	0
Microsoft Teams	0	0

Table 2 indicates the attitudes of lecturers toward online teaching and learning platforms. The criterion mean of 2.5 was used to assess the attitude of lecturers at the institutions. An average mean of 2.89, which is greater than the criterion mean, indicates a positive attitude among the sampled lecturers toward online teaching-learning platforms.

Table 2: The Attitude of Lecturers towards Online Teaching and Learning Platforms

S/N	Items	Strongly agree	Agree	Disagree	Strongly disagree	Mean	SD	Decision
1.	I feel comfortable with the thought of using online teaching to deliver instruction	200 (40.3%)	224 (45.2%)	40 (8.1%)	32 (6.5%)	3.19	.840	Positive
2	Working with online teaching platforms makes me very nervous.	32 (6.5%)	80 (16.1%)	256 (51.6%)	128 (25.8%)	2.97	.823	Positive

3	I feel unhappy when asked to teach using online teaching platforms	40 (8.1%)	64 (12.9%)	264 (53.2%)	128 (25.8%)	2.97	.843	Positive
4	Teaching on online teaching platforms does not motivate me to teach	32 (6.5%)	72 (14.5%)	256 (51.6%)	136 (27.4%)	2.00	.824	Negative
5	I like the idea of using technology, such as platforms, to deliver lectures	240 (48.4%)	200 (40.3%)	32 (6.5%)	24 (4.8%)	3.32	.799	Positive
6	I think working with online teaching is good for me	176 (35.5%)	272 (54.8%)	32 (6.5%)	16 (3.2%)	3.23	.706	Positive
7	I can spend so much time working with online teaching platforms.	136 (27.4%)	256 (51.6%)	96 (19.4%)	8 (1.6%)	3.05	.729	Positive
8	Once I start to work with the computer, I find it hard to stop	64 (12.9%)	256 (51.6%)	152 (30.6%)	24 (4.8%)	2.73	.745	Positive
9	I enjoy talking with other lecturers about online teaching platforms	88 (17.7%)	304 (61.3%)	72 (14.5%)	32 (6.5%)	2.90	.757	Positive
10	I find it difficult to assess students via online teaching platforms	32 (6.5%)	208 (41.9%)	232 (46.8%)	24 (4.8%)	2.50	.690	Neutral attitude
11	Teaching in e-learning platforms is very frustrating	32 (6.5%)	120 (24.2%)	272 (54.8%)	72 (14.5%)	2.77	.772	Positive
12	I enjoy using online teaching platforms to deliver my lectures	136 (27.4%)	272 (54.8%)	72 (14.5%)	16 (3.2%)	3.06	.738	Positive
	Average Mean					2.89		

Criterion Mean = 2.5; $\bar{x}$ < 2.5-negative attitude; $\bar{x}$ = 2.5-Neutral attitude; $\bar{x}$ > 2.5-positive attitude

The lecturers' degree of readiness for online teaching-learning platforms is shown in Table 3. The results showed that 24 participants, or 4.8% of the sample, scored low on the online teaching-learning readiness measure, 120 respondents, or 24.2% of the sample, scored average, and 352 participants, or 71.0% of the sample, scored high. This suggests that most lecturers at the institutions who participated in this study are well prepared to adopt online teaching platforms for teaching tasks. The extent to which online teaching-learning systems adjust to the teaching style of lecturers is denoted in Table 4. The criterion mean was 2.5. Given that the average mean is greater than 2.62, it can be inferred that lecturers, to a large extent, find the online teaching-learning platforms easy to use (adaptable).

Table 3: Lecturers' Level of Readiness to Use Online Teaching-Learning Platforms

Readiness level	Frequency	Percentage (%)
Low	24	4.8
Average	120	24.2
High	352	71.0
Total	496	100

Table 4: Online Teaching-Learning Platform Adaptability to Lecturers' Teaching Styles

S/N	Items Online Teaching Platforms	Strongly agree	Agree	Disagree	Strongly disagree	Mean	SD	Decision
1.	Provide me with tools to deliver content in a manner that aligns with their preferred teaching style	56 (11.3%)	217 (43.8%)	122 (24.6%)	101 (20.4%)	2.46	.940	Not adaptable
3	Makes it easy for me to incorporate my preferred teaching techniques.	546 (29.5%)	891 (48.1%)	270 (14.6%)	144 (7.8%)	2.60	.852	Adaptable
4	allows me to customize my course layout and materials to align with my teaching style	453 (24.5%)	915 (49.4%)	303 (16.4%)	180 (9.7%)	2.71	.812	Adaptable
5	Provides me with various tools that allow me to use different teaching methods (e.g., lectures, discussions, group work)	492 (26.6%)	882 (47.6%)	321 (17.3%)	156 (8.4%)	2.63	.885	Adaptable
6	Allows me to provide timely feedback to students in a way that fits my teaching style	80 (16.1)	288 58.1	56 11,3	72 (14.5)	2.76	.893	Adaptable
7	can accommodate lecturers who prefer the use of multimedia resources and visuals to enhance their teaching.	80 (16.10)	288 (58.1)	64 (12.9)	64 (12.9)	2.77	.870	Adaptable
8	efficiently offer flexibility and adaptability in teaching approaches based on lecturers' needs	80 (16.1)	272 (54.8)	72	72 14.5	2.73	.902	Adaptable
9	cater to diverse instructor preferences.	40 (8.1)	296 (59.7)	88 (17.7)	72 (14.5)	2.61	.831	Adaptable
10	promotes student engagement in a manner that aligns with my teaching strategies.	32 (6.5)	296 (59.7)	88 (17.7)	80 (16.1)	2.56	.836	Adaptable
	Average Mean					2.62		

Criterion Mean = 2.5; $\bar{x}$ < 2.5-not adaptable; $\bar{x}$ = 2.5-neutral adaptable; $\bar{x}$ > 2.5-adaptable.

The descriptive data and correlation between lecturers' attitudes toward online teaching and learning and sustainability in tertiary institutions are shown in Table 5. Sustainability and attitude toward online teaching and learning are substantially correlated (r =.114; p<.05), as Table 5 illustrates. Individuals with a strong attitude toward online teaching and learning scored highly

on sustainability, whereas those with a negative attitude toward online teaching and learning platforms performed poorly. Sustainability and attitudes toward online teaching and learning are therefore significantly positively correlated. Therefore, sustainability is impacted by lecturers' attitudes regarding online teaching and learning.

Table 5: Descriptive Statistics and Correlation between Lecturers' Attitude towards Online Teaching-Learning Platforms and Sustainability

Variables	N	Mean	SD	r	Sig
Attitude towards online					
Teaching-learning platforms	496	34.69	4.479	.114	.011
Sustainability	496	34.74	6.277		

Significant at P<0.05

Descriptive statistics and the correlation between sustainability and online teaching-learning readiness among the sampled lecturers are displayed in Table 6. As indicated, there exists a substantial correlation between sustainability and online teaching-learning readiness ($r = .118$; $p<.05$). While individuals with low scores for online teaching-learning platform readiness also had low scores for sustainability, those with high scores for online teaching-learning readiness also had high scores for sustainability. Sustainability is therefore significantly impacted by lecturers' readiness in adopting online teaching-learning platforms.

Table 6: Descriptive Statistics and Correlation between Lecturers' Readiness for Online Teaching-Learning Platforms and Sustainability

Variables	N	Mean	SD	r	Sig
Readiness for online					
Teaching-learning platforms	496	24.90	4.223	.118	.009
Sustainability	496	34.74	6.277		

Significant at P<0.05

Table 7 indicates the challenges that militate against the sustainability of online teaching-learning platforms. The top five ranked challenges were a lack of personal relationship with students, a lack of physical interaction with the class, frequent technology failures, poor remuneration of lecturers, and a lack of control over student cheating/plagiarism. Additionally, this result showed that the mean scores of thirteen [13] of the sixteen [16] items were higher than the cut-off mark (2.5). Thus, the overall challenges include the lack of in-person interaction in the classroom, the lack of in-person interaction with the course instructor, and frequent technological malfunctions, which are factors that higher education lecturers believe are working against the sustainability of online teaching and learning platforms. Insufficient compensation, inability to prevent students from cheating or plagiarizing, inability to control students' property rights, rapidly evolving software or delivery systems, increased workload, inadequate instructor training, absence of online course policies or standards, insufficient pedagogical skills for online teaching, faculty members not participating in course decision-making, and time constraints.

Table 7: Mean and Rank Order Analysis of Factors Militating against the Sustainability of Online Teaching-Learning Platforms as Perceived by Lecturers from Higher Institutions

S/N	Barrier to Online Teaching-Learning Sustainability	Mean	Rank Order
1	Lack of personal relationship with students	3.03	1st
2	Lack of physical interaction with the class	2.98	2nd
3	Frequent technology failures	2.98	2nd
4	Poor remuneration of lecturers	2.90	3rd
5	Lack of control over student cheating/plagiarism	2.90	3rd
6	Lack of control over property rights	2.87	4th
7	Rapidly changing software or delivery systems	2.85	5th
8	Increased workload	2.76	6th

9	Inadequate instructor training	2.82	7th
10	Lack of policies or standards for online courses	2.79	8th
11	Inadequate pedagogical skills for online teaching	2.76	9th
12	Lack of faculty involvement in course decision-making	2.65	10th
13	Time Constraint	2.65	10th
14	Online work is not valued for promotion and tenure	2.45	11th
15	Lack of quality curriculum	2.44	12th
16	Personal anxiety and fear of technology	2.40	13th

Table 8 indicates the strategies to adopt in ameliorating the barriers hindering the sustainability of online teaching-learning platforms as perceived by lecturers. The top five strategies that can be adopted are the motivation of lecturers through incentives, updating lecturers' knowledge with regards to online teaching and learning, monitoring of online teaching processes and improved content, accessibility to mobile data or Wi-Fi, and adopting engaging teaching methods and frequent training of lecturers on online teaching platforms. This outcome additionally demonstrates that eleven [11] strategies as measured in the study were higher than the cut-off threshold [2.5]. Thus, it can be inferred that the following are effective strategies to adopt in order to alleviate the barriers that lecturers perceive to be impeding the sustainability of online teaching and learning platforms: providing incentives to motivate lecturers; providing engaging presentations to update their knowledge; monitoring online teaching processes and improving content; providing mobile data or Wi-Fi; using an engaging teaching style and regular training; using a stable network; providing computers and a stable electricity.

Table 8: Mean and Rank Order Analysis of Strategies to Adopt in Ameliorating the Barriers Hindering the Sustainability of Online Teaching-Learning Platforms as Perceived By Lecturers

S/N	Strategies to Ameliorate Barriers to Sustainability	Mean	Rank Order
1	Motivation through incentives	3.24	1st
2	Interesting presentation on updating knowledge	3.21	2nd
3	Monitoring the Online teaching processes	3.18	3rd
4	Improved content	3.18	3rd
5	Accessibility to mobile data or Wifi	3.08	4th
6	Engaging style of teaching	3.06	5th
7	Regular training	3.06	5th
8	Utilising an appropriate teaching Style	3.00	6th
9	Stable network	2.92	7th
10	Provision of computers	2.85	8th
11	Stable electricity	2.73	9th

Discussion

This study has assessed the perceptions of lecturers with respect to online teaching and learning platforms in southwest Nigerian tertiary institutions, concentrating on what their attitudes are toward these platforms, how ready they are to adopt these platforms for teaching, and their teaching styles with this platform. Moreover, the study examined the factors that militate against the sustainability of these platforms as well as the strategies that could be adopted to ensure the continued sustainability of these platforms in the sampled universities. A finding of the study reveals favourable attitudes among lecturers toward online teaching and learning platforms. These favourable attitudes could be explained by lecturers' awareness of the necessity of online instruction to adapt to and embrace global practices. In the context of this study, institutions now promote and encourage their staff to become more tech-savvy, providing enough assistance and relevant incentives to make these lecturers more receptive to online teaching and learning concerns. This finding is consistent with those of previous studies that indicate positive attitudes of lecturers toward the deployment of online teaching and learning platforms, within the same context (35,

59). On the other hand, the findings contrast with those of past study which found that lecturers had a negative attitude toward online teaching and learning (60). This could be attributed to the contextual differences between their study and this current one.

A finding of this study has also revealed a high readiness level of lecturers in adopting online teaching-learning platforms. This suggests that lecturers at tertiary institutions are quite ready to stick with online teaching and learning technologies. With this level of readiness among lecturers, the sustainability of these online teaching and learning platforms would have a positive outlook. This is understandable given their favourable attitudes toward these platforms. Another tenable reason might be that these lecturers now realise that online teaching and learning platforms are here to stay; as a result, they must prepare to use and adapt to these platforms. Furthermore, many Nigerian tertiary institutions now subscribe to online instruction and encourage lecturers to participate in professional development/training programmes that enhance their online teaching and navigation efficacy and self-assurance. This supports the findings of previous research which found that Nigerian teachers were highly prepared for online teaching-learning platforms and were eager and highly motivated to use technology for teaching (61, 62), who. Yet, the finding differs from those of other researchers (37, 60), who show that lecturers were unprepared for online education.

The study's findings indicate that lecturers have adapted to online teaching-learning platforms as they are often flexible. This result can be explained by the lecturers' familiarity with digital tools, their exposure to training on online education, and the availability of institutional support that can help them become more knowledgeable and competent in using online teaching-learning platforms. Individuals who possess good digital abilities and sufficient training may find that online teaching-learning platforms can be tailored to their teaching preferences (63). Furthermore, some online teaching-learning platforms are inherently customizable, supporting various teaching styles, and can therefore be considered flexible (17, 33, 64, 65).

The study's findings indicate that lecturers' attitudes toward online teaching and learning and sustainability are significantly positively correlated, indicating that more positive attitudes among lecturers are linked to online teaching and learning platforms being more sustainable. It does imply that lecturers with favourable attitudes are more likely to engage with the platforms, creating further avenues for sustainable practices (66, 67). This finding contrasts with that of (68), who found that a negative impact on the relationship between attitude and sustainability, and those positive attitudes alone may not guarantee sustainable practices without adequate support (34). Also, there exists a statistically significant positive correlation between lecturers' readiness for online teaching and learning and its sustainability. This implies that the more ready lecturers are, the more sustainable online teaching-learning platforms will be. This result could be linked to the lecturers' ability to use digital resources effectively and modify their teaching strategies for online teaching-learning platforms, both of which are closely related to their readiness. Furthermore, the training support offered by different schools helps lecturers become more prepared, establishing and promoting a teaching and learning environment that can support long-term online education (69, 70).

Furthermore, this study's findings indicate the various barriers to online teaching-learning platforms' sustainability. These barriers include frequent technological malfunctions, a lack of in-person engagement with the course instructor, and a lack of in-class interaction as the factors impeding the sustainability of these online teaching and learning platforms as perceived by lecturers at higher education institutions. Others are low pay, a lack of controls over student plagiarism or cheating, a lack of control over student property rights, rapidly changing software or delivery systems, increased workload, inadequate teacher preparation, a lack of guidelines or standards for online courses, inadequate pedagogical skills for online instruction, minimal faculty participation in course selection, and time constraints. These have been reported in previous studies as militating factors to the sustainability of online teaching and learning in tertiary institutions (47, 48, 59, 71, 72).

Lastly, a finding of this study reveals the strategies that can be adopted to ensure online teaching-learning platforms' sustainability. These are by

providing incentives to motivate lecturers, providing engaging presentations to update their knowledge, monitoring online teaching processes and improving content, providing mobile data or Wi-Fi, using an engaging teaching style and regular training, using a stable network, and providing computers and a stable power supply. These tactics support earlier research that highlights the value of financial and technical assistance, professional and infrastructure development, and other creative methods to improve the sustainability of online teaching and learning (47, 48, 52, 59).

Conclusion

This study examined the role of lecturers' attitudes, readiness, and adaptability of teaching styles on the sustainability of online teaching-learning platforms in selected tertiary institutions in southwest Nigeria. The study also assessed the perceived obstacles and potential solutions for the sustainability of these platforms. Findings emerging from the study have indicated that Nigerian lecturers in the sampled tertiary institutions have favourable attitudes toward online teaching-learning platforms. These lecturers claimed to be somewhat ready to utilise these platforms. They believe that online teaching-learning platforms are adaptable to diverse teaching styles. Findings of the study further revealed a significant correlation between lecturers' attitudes, readiness, and the sustainability of online teaching-learning platforms.

Several challenges were found to be affecting the sustainability of these platforms, ranging from a lack of in-person interaction, frequent technical malfunctions, insufficient training, and a lack of institutional policies. More so, strategies for addressing these challenges and fostering the sustainability of these platforms were enhanced pedagogical approaches, incentives, regular professional development and training, infrastructure provision, and easily accessible internet connectivity. These results indicate that comprehensive mediations encompassing institutional assistance, infrastructure investment, and ongoing capacity building are required. Sustained online teaching-learning platforms can be achieved, in essence, but only if pedagogy, policy, and practice are in harmony. Additionally, the positive attitude and high level of lecturers' readiness must be balanced with purposeful institutional action and resource provision.

Recommendations

In furtherance of the aforementioned, this study recommends that the administrative arm of Tertiary education institutions should implement incentive-based strategies that recognize and compensate lectures who take an active part in online learning. This could entail stipends, teaching rewards, or prompt promotion consideration. To improve the lecturers' digital competency and pedagogical approaches for online teaching and learning, a frequent, flexible, practical, and discipline-specific training workshop should be held. Governments and institutions should ensure the provision of adequate ICT infrastructure, including consistent electricity, fast internet connection, innovative digital technologies/teaching tools. Also, mobile data subscription should be guaranteed under subsidised or institutional access for lecturers.

Dedicated support teams should be set up to track online teaching activities, offer technical help, and routinely assess the quality and state of infrastructure. There should be early identification of issues through close cooperation among lecturers, administrators, and IT staff, which can guarantee the development of context-centered solutions. Standards and quality assurance systems should be designed and made functional, to establish a thorough online teaching-learning process and promote uniformity, pedagogical reliability, and institutional accountability.

Thus, concerted efforts at addressing infrastructural challenges especially for tertiary institutions in Nigeria and other developing countries require coordinated investment and continued funding in ICT infrastructure, internet access, and digital literacy. This should be complemented by capacity-building for faculty and students to maximize benefits. Prioritization of infrastructure projects that align with national development and economic diversification, with strong and accountable university governance and management system. Digital expansion, inclusivity, sustainability planning and maintenance, and international support, require further attention. Donor-led capacity-building and infrastructure grants aimed at supplementing domestic efforts in resource-constrained universities are prioritised.

Limitations of the Study and Future Research Directions

This study may not have accurately captured the respondents' subjective and contextual experiences regarding online teaching-learning platforms in the sampled universities due to its quantitative nature, and the sample may not be typical of the total population. Bias in self-reporting and deliberate selection of Government-owned (public) tertiary institutions out of the numerous universities in southwest Nigeria may have affected the study's conclusions and applicability to other contexts. Potential confounding variables and time constraints may have influenced this study's results and our final conclusions. Future research should consider using mixed methodologies, a larger sample size, a longitudinal approach, as well as other variables not considered in this current study to explore similar research concerns in the same or similar contexts.

Abbreviations

Not applicable.

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Author Contributions

Chinedu Hillary Joseph: conceptualization, wrote the first draft of the manuscript, methodology, data collection logistics, discussed the findings, wrote the conclusion, Mensah Prince Osiesi: conceptualization, wrote the first draft of the manuscript, methodology, analysed and interpreted the data, discussed the findings, wrote the conclusion, critical reading of the manuscript, Oluwatoyin Adenike Adaramoye: data collection logistics, analysed and interpreted the data, Olaide Sakiru Hammed: data collection logistics. All authors reviewed the manuscript and approved of its current state.

Conflict of Interest

No conflict of interest is declared by the authors.

Declaration of Artificial Intelligence (AI) Assistance

The authors declare that generative AI and AI assisted technologies were not used in the writing of this article.

Ethics Approval

Ethical Approval was obtained from the Research Ethics Committee of the Faculty of Education, Federal University Oye-Ekiti, and Nigeria (FUOYE/ED/2024/013/0017).

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