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Smart Learning Environments: A Pathway to quality University education in Nigeria

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Abstract

The study examined smart learning environments as a pathway to quality university education in Nigeria. The population of the study comprised all lecturers in the four government-owned universities in Bayelsa State. However, the researchers were unable to determine the precise number of lecturers at the time of this investigation due to data collection constraints. Based on the advice of Fox et al. (2007) and Meyer (1979), the researchers chose to adapt 384 samples from a population with an unconstrained range. The data used were collected through an online questionnaire; however, 296 lecturers responded by filling out the questionnaire. The findings reveal that smart learning tools such as projectors, internet facilities, computer-based test, mobile learning devices are readily available, while smart boards, video conferencing tools, digital cameras, and LMS are moderately available. On the contrary, virtual and augmented reality, smart classrooms, and gamification are not widely available, and the majority of the respondents are not familiar with them. There is an increased utilization of internet facilities, computer-based text, projectors, and mobile devices in the teaching processes, while other technologies such as LMS, smart boards, video conferencing tools, as well as virtual and augmented reality, gamification, and smart classes, are still emerging technologies. Lecturers have a positive perception of the utilization of smart learning technologies, noting that lack of adequate funds, lack of adequate electricity supply, and poor internet facilities were some of the major challenges in the utilization of SLE. Based on the findings, the researchers recommended, among others, that the universities should focus on improving the infrastructure, particularly reliable electricity supply and internet connectivity, and increase funding for the development of new smart learning systems, such as virtual reality, gamification, smart classrooms, etc.

Keywords: Nigeria, University education, Smart learning environments, Traditional education

Introduction

Since the earliest days of recorded human history, technology has played an essential role in the educational process, particularly in the creation and dissemination of knowledge. The human development and technological development are found to have a very strong positive correlation; this is because the human kind is but an improvement of the tools that it employs to achieve its goals (Bejan, 2020; Dhurumraj et al., 2021; Ewata, 2021). Technological development serves as a catalyst for human development by enhancing education, healthcare, and economic opportunities. According to Barger (2020), digital platforms like Coursera have democratized access to quality education, bridging gaps for underserved populations. Similarly, telemedicine and AI-driven

diagnostics have improved healthcare in resource-limited regions (World Health Organization, 2022). The shift from oral tradition to digital technologies demonstrates how communication advancements have transformed education, enabling interactive, personalized, and globally connected smart learning environments. This evolution has made quality education more accessible, especially in university settings, where digital tools bridge gaps in infrastructure and resources. In general, technology, particularly the Internet, has facilitated a number of changes in many industries, including education, where technologies are currently changing the way both instruction and learning occur (Cheung et al., 2021).

Universities across the globe are under immense pressure to adopt the rapidly evolving technologies resulting from several needs of students plus the demands of the current employment markets. The rising costs of education, rapid students' population growth, and the need for equitable access to education are some of the challenges driving the adoption of technology in higher institutions (Mirata et al., 2020). Moreover, the COVID-19 crisis also revealed the importance of online learning, as many universities, especially in developed countries, had to quickly shift to online learning to continue teaching in the face of global lockdown. This serves as a panacea in times of crisis, which has further stressed the need for the development of SLE, especially in developed countries.

SLE is defined as any learning environment with support of advanced technologies to improve learning. These environments use computer technology, smart data, and learning management systems to enhance the teaching and learning process. Ogunbodede & Achugbue (2023) opined that SLE is a learning platform that involves the use of technology to facilitate students' access to content, instructional material, learning modality, and students/faculty interface. It fosters improved provisions of education, particularly in line with the student's learning modalities. This can include strictly instructional tools and resources such as digital textbooks, web applications for learning, and other forms of media that can support education, such as gaming. SLE consists of a broad range of technologies, digital applications, and multimedia resources that foster learning for each learner. They promote teamwork among students and flexibility in how they learn. Most importantly, the adoption of SLE is a paradigm shift in how students' access education (Demir, 2021).

The use of SLE is on the rise in developed countries as institutions are adopting improved technologies in teaching that offer learners personalized learning experience. The application of adaptive learning technologies is on the rise in the United States, for instance, Arizona State University has integrated platforms that design content based on students' performance, thus increasing their learning achievements and dropout rates (Duarte-Garcia et al., 2022). Schools in Finland, especially in the city of Helsinki, have incorporated the use of the internet of things, smart boards, and sensors to enhance their teaching and learning processes. To ensure students engage in teamwork, teachers track data in real-time and then use the information to change strategies that they use in a class. Teachers can monitor real-time data, modify, and make the whole practice more interactive and an engaging process for the learners (Leong et al., 2021). The University of Queensland in Australia also has games in the teaching and learning process known as Game On, which integrates game to augment reasoning and active learning to foster learners' motivation and learning engagement (Hwang, 2014). The use of adaptive learning, IoT, blockchain technology, and gamification enhances student engagement while offering a learning system that is tuned to each individual student's needs.

In Nigeria, the university educational system has several challenges, including inadequate infrastructural facilities, inadequate funding,

recurrent strikes, shortage of academic staff, insecurity among others (Monday et al., 2021). These factors gave rise to the deteriorated quality of university education in Nigeria and hamper the country's capacity to address the educational needs of the growing youthful population. Therefore, integrating the SLE into the Nigeria university system, provide a feasible solution for tackling these challenges and enhance the quality of university education in Nigeria (Ogunbodede & Achugbue, 2023). However, Nigerian universities are gradually developing interest towards the establishment of SLEs because quality education plays a significant role in enhancing development and progress in any nation and the world in general (Olutola & Olatoye, 2020).

The integration of the SLE can improve the quality of university education in Nigeria through the provision of improved technology meant to support learning and data management (Al_Janabi, 2020; Ullah et al., 2024). As a result of implementing systems, such as artificial intelligence, machine learning, and-real time data capturing techniques, the various universities in Nigeria can offer very special forms of teaching and learning processes that can enhance the performance levels of the learners and the results. Furthermore, SLEs can offer students convenient access to a wide range of digital materials that can help them achieve their educational goals in groups or individually within a flexible time-space frame (Naidu et al., 2017). This study, therefore, seeks to identify the types of smart learning technologies available, the level of adoption of smart learning technologies among the lecturers, the perception of lecturers on the adoption of SLE, and the challenges encountered in the adoption of a SLE in universities in Bayelsa State, Nigeria. This research therefore seeks to advance the empirical literature on how SLEs could be used to enhance university education in Nigeria to continue to remain relevant, resilient, and responsive to future challenges.

Statement of the Problem

The Nigerian university educational system is faced with several challenges, including inadequate infrastructural facilities, inadequate funding, recurrent strikes, shortage of academic staff, insecurity among others. These factors have lessened or weakened the quality of university education in Nigeria, hindering students access to equitable and quality university education. A possible solution to these challenges is the use of SLEs in the Nigerian universities. SLEs incorporate digital tools, technology in delivery methods, and other facilitative e-learning facilities, putting together an effective learning process. It encourages students to gain easy access to different resources, be able to attend classes online, have interaction with computerized classes, and even do laboratories virtually. Although SLE is becoming a global trend, there are limited studies on the types of smart learning technologies available, the level of adoption of smart learning technologies among lecturers, the perception of lecturers on the adoption of SLE, and, the challenges encountered in the adoption of a SLE in universities in Bayelsa State, Nigeria. This research therefore seeks to advance the empirical literature on how SLEs could be used to enhance university education in Nigeria to continue to remain relevant, resilient, and responsive to future challenges.

Objectives of the Study

The specific objectives are:

1) To identify the types of smart learning technologies available in universities in Bayelsa State

2) To examine the level of utilization of smart learning technologies among the lecturers

3) To ascertain the perception of lecturers on the utilization of smart learning technologies

4) To determine the challenges in the utilization of a SLE in universities in Bayelsa State.

Research Questions

The following questions guided the study:

1) What are the types of smart learning technologies available in universities in Bayelsa State?
2) What is the level of utilization of smart learning technologies among lecturers for teaching?
3) What is the perception of lecturers on the utilization of smart learning technologies?
4) What are the challenges in the utilization of a SLE in universities in Bayelsa State?

Literature Review

Four main principles serve as the framework for this literature review: the types of smart learning technologies, the level of utilization of smart learning technologies by lecturers, the perception of lecturers on the utilization of smart learning technologies, and the challenges in the utilization of a SLE in universities.

Types of Smart Learning Technologies

Alajmi et al. (2017) examined e-learning models and the effectiveness of the cloud-based e-learning model over the traditional e-learning model in Saudi Arabia. The study found that higher education in Saudi Arabia has been changing to a more internet-based education, accompanying the rapid development of information technology, including software and hardware devices. Siemens (2013) also observed that Saudi education sector uses smart learning devices such as phones and computer devices are used for communication purposes among teachers, instructors, and students. In a related study, Organisation for Economic Co-operation and Development (2021) did a study on pushing the frontiers with artificial intelligence, blockchain, and robots in education. The findings show that educational institutions in Shanghai, China are incorporating AI into teaching and resources management. AI is used to collect and analyze campus data, manage environmental factors, and collect physiological and academic data through wearable devices. This integration of AI and robotics enhances both the management and the teaching and learning processes. Various studies have also revealed that higher institutions in advanced countries use smart technologies such as smartphones, laptops, and tablets (Fayez et al., 2021). Likewise, Rahmat et al. (2023) examined teachers' perspectives toward using augmented reality technology in science learning in Indonesia.

A mixed research design was employed in collecting quantitative and qualitative data, and the population comprised 32 teachers. The study found that many teachers had less knowledge of AR technology, but they were highly interested in implementing the technology. In the Nigeria context, Onyia (2023) investigated the types of smart technologies available in south-east universities in Nigeria. The study design was descriptive survey, and the population constituted 500 lecturers. The survey revealed that the south-eastern universities have smart phones, iPads, laptops, tablets, internet, and e-libraries, while laptops, smart boards, digital cameras, smart tables, projectors, and smart classrooms are unavailable. In another study, Bubou & Job (2023) did a mini review of the benefits, challenges, and prospects of integrating e-learning into Nigerian tertiary institutions. The study revealed that the National Open University of Nigeria was the first in incorporating digital learning facilities such as internet facilities and computer-based tests. The University of Port Harcourt, the University of Ibadan, and the Obafemi Awolowo University also have electronic learning facilities such as course management software and virtual learning environments. The studies highlight a clear divide in the integration of advanced technologies between developed countries and Nigeria. While developed nations are at the forefront of AI, AR, and robotics adoption, Nigeria's education sector is still grappling with basic infrastructure challenges. To bridge this gap, Nigerian institutions need significant investments in infrastructure, training programs, and policy support to enable broader adoption of emerging technologies in education.

Level of Utilization of Smart Learning Technologies by Lecturers

Moorhouse (2023) explored the use of digital technology after online teaching in Hong Kong teachers. The study further implies that the period of online teaching has promoted the use of technologies in the teaching practice. Additionally, they state that they see that digital technologies have become situated in teachers' daily teaching repertoire; they establish that the adopted digital technologies are mainly a shift of practice improvement. Similarly, Wagwu et al. (2022) explored the arising tenet of library and information science education in the Covid-19 era. The approach the present researchers embraced was the descriptive survey, and the population of the study was 50 LIS lecturers in three universities in Rivers State. It was clearly established that most LIS lecturers of the sampled institutions used two digital platforms, namely Zoom and Whatsapp, for teaching online.

According to Onyia (2023), the lecturers are poorly implementing smart phones, iPads, tablets, and e-library in their teaching practice but are highly implementing laptops and the internet for teaching. The studies pointed out that use of digital technologies has increased, especially during the pandemic when learning moved to the online environment. Some of the technologies (like Zoom, WhatsApp) were utilized effectively for online education, others (smartphones, iPads) were not so often. The use of technologies as supplementary methods to traditional teaching methodologies has become more common in the post pandemic teaching environment.

Perception of Lecturers on the Utilization of SLE

Mafruudloh et al. (2021) investigated English teachers' perceptions and practices of the role of technology in online teaching during the pandemic Covid-19 The results revealed that teachers were receptive to using technology-based instruction in their classrooms, at least using the type of method presented throughout this study, for a number of purposes. Also, Fonseca et al. (2023) surveyed the attitudes related to the use of e-learning tools lecturers teaching in higher learning institutions in Portugal. The findings indicated that the lecturers saw the changes as easy to shift from face-to-face to an e-learning context, and most of them still supported e-learning after the pandemic. Altogether, Osuji & Nwoke (2019) explored the perspective on the role of e-learning in science education within teacher training institutions amongst pre-service teachers. The findings of the study showed that pre-service teachers embraced e-learning for science education because of its strengths in the provision of opportunities for learning, self-learning, access, course comprehension, and others. In general, the review reveals a moderately positive and negative attitude toward the use of the identified technologies for digital learning. For flexibility and increased learning, teachers and pre-service teachers expressed generally positive attitudes towards e-learning. Throughout the studies, several lecturers' showed resistance to implementing an LMS, especially in the study conducted earlier. However, in more recent work, the forced shift induced by the pandemic to e-learning maintained the acceptance and continued use of such tools in higher education.

Challenges in the Utilization of SLE

In a study, Asad et al. (2021) pointed out that the difficulties of employing e-learning and information technology in teachers' practice and learning atmosphere of higher education institutes in Pakistan are as follows: The management of the university never encourages the teachers to adopt the ICT in their teaching and learning because they consider that the resources are limited, and they are not professional enough. Also, in a study by Ogunbodede & Wiche (2021), some of the problems identified in the usage of smart technologies for online learning include; poor funding, inadequate electricity supply, lack of sufficient support from the government, and lack of favourable library resources. Further, Ajani et al. (2022) quantified the

barriers to the integration of internet-based methodology into the classroom as including the following; Limited expertise, Energy related problems, Technical infrastructure, Connectivity and the Cost of data used in internet connection among others. Onyia (2023) mentioned certain problems associated with the application of smart technology in school as some of the smart technologies are unavailable, the sender is not acquainted with the particular technology, and the receiver shies from using smart technologies, and so on. The review highlights the many difficulties experienced by higher learning institutions in the implementation of e-learning and smart technologies. Some of the challenges encountered include scarcity of funds, lack of support from faculties and departments, hiring of inadequate technical equipment and networking infrastructures, high costs, and scarcity of necessary technical skills, which result in slow integration and poor utilization of ICT in enhancement of teaching learning processes.

Methodology

The study used a descriptive survey design because it can help to gather quantitative data to describe and analyze the perceptions and experiences of the target population. The study population comprised all the lecturers in the four universities in Bayelsa State, Nigeria. However, the researchers were unable to determine the precise number of lecturers at the time of this investigation due to data collection constraints. Based on the advice of Fox et al. (2007) and Meyer (1979), the researchers chose to adapt 384 samples from a population with an unconstrained range. The researchers suggested that future research should include a more representative sample. The data used were collected through an online Google form survey, which was opened for two months. A brief description of the research, the subject of the study, its aims and objectives of the study, together with the assurance that the respondent's anonymity. The demographic characteristics of the respondent were elicited in Part A, while the four items in Part B (research questions) were constructed particularly to collect data on the research question. The questionnaire underwent both face and content validity testing to ascertain how the questions are structured and if they are compatible with the primary aims of the research.

Two measurement and evaluation experts verified the instrument. The instrument's dependability was tested using Cronbach's alpha, and the result was 0.82. Based on the obtained coefficient, it was decided that the questionnaire was reliable. SPSS version 23 was used to calculate the mean and standard deviation after the study's data were analysed using frequency counts and simple percentages. Responses of the questionnaire were measured and analysed with a nominal scale and 4-point Likert-type scale. On the scale, a criterion score of 2.5 was adopted. The criterion score was obtained as follows: Criterion score = $(4 + 3 + 2 + 1)/4$ = 2.5. For research question 2, items having a mean score of 2.5 and above were considered as positive perceptions, while those below 2.5 were considered negative perceptions. For research question 3, items having a mean score of 3.1 and above were considered as having a high extent of utilization, while the mean score between 2.5 and 3.0 was considered as a moderate extent of utilization, and those below 2.5 were considered a low extent of utilization. The choice of a 2.5 criterion score on a 4-point Likert scale is significant in interpreting survey results, as it mathematically represents the midpoint between the lowest (1) and highest (4) values. This score provides a middle ground for respondents, allowing them to express a stance that is neither strongly negative nor strongly positive. While the scale itself does not include an explicit neutral option (as in a 5-point scale), the 2.5 score serves as a functional midpoint between disagreement and agreement, offering an intermediate response. For research question 4, items having a mean score of 2.5 and above were considered as agreed, while those below 2.5 were considered disagreed.

Table 1. Gender of the respondents

Gender	Frequency	Percentage %
Male	169	57
Female	127	43
Total	**296**	**100**

The finding show that the majority of the respondents were male lecturers.

Research questions

Research Question1: What are the types of smart learning technologies available in universities in Bayelsa State?

Table 2: Types of smart learning technologies 296

S/N	Types of smart learning technologies	Available	Not Available	Not Aware
1.	Projectors	281	15	-
2.	Internet facilities	280	12	4
3.	Computer-based test	268	19	9
4.	Mobile learning (Laptops, Smart phones, Tablets, Ipads, e-readers, etc.)	226	40	30
5.	Smart boards	169	98	29
6.	Video conferencing tools	155	98	43
7.	Digital cameras	148	108	40
8.	Learning management system (LMS)	138	88	70
9.	Virtual and augmented reality	100	112	84
10.	Smart classrooms	88	153	55
11.	Gamification (Google's read along, Kahoot, Learning games, Simulation games, etc.)	74	124	98

Table 1 displays data on the availability, unavailability, and awareness of various types of smart technologies among a sample of 296 lecturers in universities in Bayelsa State. The table reveals that smart learning tools like projectors, internet facilities, computer-based tests, mobile learning devices are readily available. However, smart boards, video conferencing tools, digital cameras, and LMS are moderately available. On the contrary, technologies reported as "Not Available" the most include smart classrooms (153), gamification tools (124), and virtual/augmented reality (112), indicating significant resource or infrastructure gaps, while projectors (15) and internet facilities (12) are the least unavailable. Conversely, technologies with the highest unawareness are gamification tools (98), virtual/augmented reality (84), and LMS (70), highlighting the need for better training and awareness efforts, whereas projectors (0) and internet facilities (4) are widely recognized.

Research Question 2: What is the level of utilization of smart learning technologies among lecturers for teaching?

Table 3: Level of Utilization of Smart Learning Technologies

S/N	Level of Utilization	VH	H	L	VL	Mean
1.	Internet facilities	183	68	30	15	3.4
2.	Computer-based test	158	78	30	30	3.2
3.	Projectors	138	80	74	4	3.2

4.	Mobile learning (Laptops, Smart phones, Tablets, Ipads, e-readers, etc.)	123	98	60	15	3.1
5.	Learning management system (LMS)	70	71	90	65	2.4
6.	Smart boards	58	73	90	75	2.4
7.	Video conferencing tools	69	67	85	75	2.4
8.	Virtual and augmented reality	30	71	85	110	2.1
9.	Gamification (Google's read along, Kahoot, Learning games, Simulation games, etc.)	30	51	105	110	2.0
10.	Smart classrooms	24	62	80	130	1.9
	Grand Mean					**2.6**

Table 3 shows the level of utilization of smart learning technologies among lecturers for teaching. Items 1-4 have mean values that are higher than the criterion mean (2. 5), while items 5-10 have mean values that are lower than the criterion mean (2. 5). However, the grand mean (2.6) is higher than the criterion mean (2. 5), which suggests a moderate extent of smart learning technology utilization. This means that while there is an increased utilization of internet facilities, computer-based text, projectors, and mobile devices, other technologies such as LMS, smart boards, video conferencing tools, as well as virtual and augmented reality, gamification, and smart classes are still emerging technologies.

Research Question 3: What is the perception of lecturers on the utilization of smart learning technologies?

Table 4: Perceptions of Lecturers

S/N	Perceptions of Lecturers	SA	A	D	SD	Mean
1.	I am willing to adapt and incorporate smart learning technologies into my teaching	211	85	-	-	3.7
2.	The adoption of SLE will improve the quality of teaching and learning in universities	226	55	15	-	3.7
3.	The utilization of SLE will enhance access to quality university education and improve the learning experience of students	205	75	16	-	3.6
4.	The utilization of SLE will facilitate collaborative learning among students	210	78	10	-	3.6
5.	The utilization of SLE will help reduce the burden on teachers by providing automated feedback and assessments	197	86	13	-	3.6
6.	The utilization of SLE will improve students' participation in class	168	108	20	-	3.5
7.	The utilization of SLE will provide students with access to high-quality digital resources that may not be available in traditional classroom settings	185	91	5	5	3.4
8.	The utilization of SLE can enhance education access for marginalized students and enable them access learning from anywhere, at any time	167	110	14	5	3.4
	Grand Mean					**3.6**

Table 4 shows that items 1-8 have mean values that are above the criterion mean of (2.5), more so, the grand mean (3.6) is higher than the criterion mean (2.5). This suggests that the respondents have positive perceptions on the utilization of smart learning technologies. The positive perceptions show that the respondents have a positive attitude towards smart learning technologies and are willing to accept them, with an understanding of certain benefits of such an approach.

Research Question 4: What are the challenges in the utilization of a SLE in universities in Bayelsa State?

Table 5: Challenges in the Utilization of SLE

S/N	Challenges in the adoption of SLE	SA	A	D	SD	Mean
1.	Inadequate funding for university education	220	68	8	-	3.7
2.	Inconsistent electricity supply	228	58	10	-	3.7
3.	Lack of adequate Internet facilities	180	102	14	-	3.6
4.	Resistance to change	95	91	80	30	2.8
5.	Lack of digital skills	80	103	83	30	2.8
	Grand Mean					**3.3**

Table 5 shows that all the items 1-5 have mean values that are above the criterion mean (2.5); more so, the grand mean (3.3) is higher than the criterion mean (2.5). This means that items 1-5 are the challenges in the adoption of SLE universities in Bayelsa State. In general, the grand mean of (3.3) suggests that there are still numerous difficulties in implementing SLE in these universities, with the commonest being a lack of adequate funds, a lack of adequate electricity supply, and poor internet facilities.

Discussion

The first research question reveals that smart learning tools like projectors, internet facilities, computer-based test, mobile learning devices are readily available in universities in Bayelsa State. However, smart boards, video conferencing tools, digital cameras, and LMS are moderately available. On the contrary, virtual and augmented reality, smart classrooms, and gamification are not widely available, and the majority of the respondents are not familiar with them. Rahmat et al. (2023) in their study found that many teachers had less knowledge of virtual and augmented reality. The results point to a worrisome lack of virtual and augmented reality, smart classrooms, gamification, etc., despite basic smart learning technologies being comparatively available. The study shows that infrastructure challenges and financial limitations may have prevented these institutions from providing access to advanced technologies that would prepare students for future learning experiences. This finding conforms with that of Onyia (2023) who also found some basis smart learning technologies available in south-east universities. Research question two revealed that there is an increased usage of internet facilities, computer-based text, projectors, and mobile devices in the teaching processes, while other technologies such as LMS, smart boards, video conferencing tools, as well as virtual and augmented reality, gamification, and smart classes are still emerging technologies. The result suggests that basic smart technological tools are already adopted in the teaching-learning process by the universities, nevertheless, advanced smart technologies such as LMS, smart boards, video conferencing, virtual and augmented reality, and gamification are either in progress or just at the implementation stage. Consequently, the study reveals that as institutions are improving their applications of the basic technologies, the lack of resources and infrastructure reduces the application of advanced technologies, thereby establishing disparities in students' learning

experiences. Research question three shows that lecturers have positive perceptions of the utilization of smart learning technologies. The positive attitude of lecturers towards the use of smart learning technologies means that they are willing and prepared to incorporate these technologies in their teaching to improve students' engagement and performance. Lecturers' positive perception can be perceived as a positive context for technology use, which is probably helpful for training and integration. This openness gives the institutions a chance to improve the learning and teaching processes, hence increasing engagement with the students and improved learning outcomes. This is in agreement with the finding of Mafruudloh et al. (2021) who found lecturers have a positive perception and are willing to embrace online learning tools in their classrooms. Lastly, research question four reveals that lack of adequate funds, lack of adequate electricity supply, and poor internet facilities were some of the major challenges in the utilization of SLE. Inadequate funding for schools, erratic supply of electricity, and limited access to the internet all affect the provision and effective utilization of SLE tools, thereby distorting the quality of education. If these issues are successfully tackled through investment, policy, and partnership, then the provision of infrastructure can improve access to technology-based learning resources for students and teachers. This finding is in line with that of Ogunbodede & Wiche (2021) who also found that poor funding, epileptic power supply, lack of adequate support from the government, etc., were some of the challenges in the use of smart technologies for online learning.

Conclusion and Recommendations

The findings reveal that smart learning tools like projectors, internet facilities, computer-based test, mobile learning devices are readily available, while smart boards, video conferencing tools, digital cameras, and LMS are moderately available. On the contrary, virtual and augmented reality, smart classrooms, and gamification are not widely available, and the majority of the respondents are not familiar with them. There is an increased utilization of internet facilities, computer-based text, projectors, and mobile devices in the teaching processes, while other technologies such as LMS, smart boards, video conferencing tools, as well as virtual and augmented reality, gamification, and smart classes are still emerging technologies. Lecturers have positive perceptions on the utilization of smart learning technologies, and that lack of adequate funds, lack of adequate electricity supply, and poor internet facilities were some of the major challenges in the adoption of SLE. Based on the findings, the researchers recommended that the universities should focus on improving the infrastructure, particularly reliable electricity supply and internet connectivity, and increase funding for the development of new smart learning systems, such as virtual reality, gamification, smart classrooms, etc. Periodic training and sensitization programs should be conducted for lecturers on smart boards, learning management systems, and video conferencing tools to enhance lecturers' knowledge and capability to incorporate these technologies into the teaching procedures.

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