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Implimentation, Management of Digital Smart Board and Students' Learning Outcome in Tertiary Institutions in Nigeria: A Case Study of Economics Courses

Nathan Udoinyang[1], Omoghenemuko Greg Imoniyovwe[2],

Ojeje Mercy Aruoriwo[3], Paul Jackson Ireyefoju[4],

Sakpaide Joy[5], Okubotimibi Johnson Eyes[6]

[1]Department of Economics, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State Nigeria

[2]Department of Computer Science, College of Education Warri, Delta State Nigeria

[3,4,5,6]Department of Educational Management, College of Education Warri, Delta State Nigeria

Abstract

This study adopts survey research design to examine the impact of digital smart board on students learning outcome in tertiary institution in Nigeria: a case study of economics courses. Primary and secondary data were employed in the study. The population of this study includes the entire population of Nigeria. Its total population was estimated at 140,003,542 according to 2006 census. With the use of Taro Yamane, the population size was reduced to 400, a total of 400 questionnaires were distributed among students' and lecturers of which 306 sample size returned. With a mean and standard deviation criterion of 3.0, the statistical tools of the Statistical Package for the Social Sciences (SPSS) and Cronbach Alpha correlation level of 0.05 were used to analyse the study's research questions. Findings from the study show that DSB enhanced student engagement, performance and participation,

[1]Corresponding Author, email: nathannathanudoinyang@gmail.com

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[2]Second Author
[3]Third Author
[4]Fourth Author
[5]Fifth Author
[6]Sixth Author
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improved understanding of complex concepts, increased knowledge retention and encourages interactive analysis, makes learning interactive, increased student confidence and motivation etc. The study gave some recommendations and concluded that by leveraging interactive DSB, economics educators in Nigerian higher institutions can create an engaging, effective, and personalized learning environment that will enhance Nigeria's student learning outcomes and prepare them for both local and international rapid changing economy.

Keywords

Digital Smart Board; Economics; Management; Nigeria; Students; Tertiary institutions.

Introduction

Smartboards, also known as interactive whiteboards, are digital boards used in classrooms and other educational environments. Interactive smart boards have become popular in the educational system from elementary to university level (Bell, 2003). Psychological research has shown that learning is most effective when four essential characteristics are present: active participation, participation in groups, frequent interaction and feedback, and connection to real contexts. Research in educational technology has shown that the use of smart tablets increases the interactive space in the classroom. The interactive quality of the smart tablet provides an opportunity for student engagement not offered by other presentation methods, especially the traditional method. They allow teachers and students to interact with digital content such as presentations, videos and websites by touching the screen, using a pen or other input device. Smart tablets are a great tool to improve education and improve student learning outcomes. It is used in a variety of environments, from traditional classrooms to online learning environments. Learning is said to occur when students are able to do what they have learned without help. Research has shown that students learn better when they are taught with pictures, videos and audio clips. Interactive smart board (ISB) is one of the device that enhance and facilitate learning among students in all level of education in Nigeria and the world at large. Despite the fact that the Nigerian government invested heavily in the educational sector of the country and the budgetary allocation of educational sector in Nigeria has kept on increasing year in year out, but the full implementation of technology in Nigerian schools has not yet been realized due to high level of corruption (Jones, Beynon-Davies, Apulu, Latham, & Moreton, 2011). The actual funds release for intended projects are hardly spent, rather it goes to the pockets of some few individuals who are assigned to execute particular projects, unless the government takes some necessary measures to wipe out the

corrupt practices among such individuals from the system for actualizing the implementation of technology in the Nigerian schools may not be realized (Nwabuzor, 2005).

Udoinyang (2020) defined management as the organizational process that include strategic planning, organizing, staffing, setting objectives, managing resources, leading or directing, and controlling an organization to accomplish the goals or target of the organization by deploying the human, technological, natural, and financial resources needed to achieve these objectives and also measuring result. It is also seen as achieving a task through the use of other people. School management is the coordination of human and material resources within the school for the purpose of achieving the optimal predetermine goals and objectives of education (Udoinyang,2020).

A major role of school management is to ensure that education goals and instructional objectives are achieved by the learner- with a general improvement in the learners' performance. School management is always interested in any technology that can promote effective teaching and learning, which in turn will bring about enhanced learners' learning outcomes- for this is the vision of every school management in the 21st century. One of the ways in which the management of a 21st century school can effect change and innovation in the classroom, is by the implementation of the digital interactive smart board initiative in the classroom; for teaching and learning. This definitely helps the teacher in enhancing the learners' motivation to learn and consequently improve their performance (Omoghenemuko, 2024). Venkatesh & Bala, in Suha et al. (2015) posit that school support refers to the degree, to which an individual believes that schools are committed to the successful implementation and use of the interactive whiteboard. School management support refers to the degree to which a school supports the adoption of the use of the interactive whiteboard as a new technological tool in teaching. Mutohar (2012) states that if the school actively motivates teachers to use the interactive whiteboard, teachers will be more likely to use the interactive whiteboard. He also puts forth the idea that an important measure is the provision of support for teachers in the integration of technology such as the digital interactive smart board technology. Ideally, school management should provide technological support for effective teaching and learning- for example: teach the teachers to troubleshoot and to overcome instructional issues. In all spheres of life, new technologies have become a common occurrence, and their usage has not only connected the entire world, but also influenced practically all human endeavours, in the areas of Agriculture, Engineering, Education, Medicine, Law, Architecture, Aviation, Commerce, Insurance, Banking and Finance,

Maritime activities, and particularly education. In the past, education was mainly teachers-centred; as a result, teachers deliver concepts or subjects while students only listened without contributing much to the instructional processes. New technologies however, in education, have given students opportunities to participate more in their classroom processes. The use of new technologies in education is becoming increasingly significant as nations including Nigeria is beginning to shift fast to digitalization, and its importance will continue to expand and evolve in the twenty-first century. Smart Board appeals to both intrinsically and extrinsically motivated students. According to a case study of the Jennings school District (2005) in St. Louis Missiouri, Dr Terry Stewart and his staff believed that students' performance should not be defined by test scores alone but also by attendance levels, motivation and behaviour. The author further stated that putting Smart Board in the hands of properly trained staff improves classroom enjoyment and motivation, particularly on the part of extrinsically motivated learners and also has less migration.

Bell (2003) also stated that responses to open-ended questions show that students are more attentive, focused and motivated when teaching lessons using a smart tablet. in other teaching methods. Sovie (2004) reported in a study on smart tablets and their impact on student learning that smart tablets are effective in engaging students in literacy learning. In addition, Cox et al (2003) also found that smart boards allow teachers to gain deeper understanding of students' interests while at the same time improving student learning through collaboration. Kent (2003) showed that teaching with an interactive smart board is more effective, fun, engaging and affects the speed and depth of learning. The Smart Board allows students to observe the behaviour of peer leaders and take appropriate actions to make that behaviour more attractive. This is because short pupils can only focus on a scene as long as it is on the TV screen. Many courses offer online versions of traditional classes without face-to-face interaction between instructors and students. These e-courses often contain online content without a significant level of creativity or interactivity. Psychological studies show that adding a smartphone can improve learning if certain techniques are used. By using auditory and visual methods to present information, they process this information faster and when they need it, thus improving and strengthening the learning process. However, it is unclear whether students' learning outcomes will increase or if they will reach the performance level of a traditional classroom. To this end, this paper examines the impact of digital smart board on students learning outcome in tertiary institution in Nigeria while lecturing economics courses.

Theoretical Literature

This paper is anchored by two theories: Vygotsky's theory of sociocultural cognitive development and Bandura's social learning theory (1977).

Vygotsky's Theory of Sociocultural Cognitive Development

Lev Vygotsky (1896-1934) was a Russian therapist and teacher who developed concepts about how social interactions influence our cognitive development. He highlights the role of active learning, social interaction, scaffolding, construction of knowledge and collaborative learning. This concept recognizes that infants' cognitive development and ability to acquire knowledge can be guided and modified through social interaction. His idea (also known as Vygotsky's sociocultural concept) says that acquiring knowledge is an important part of social life rather than an adventure of discovery. He expanded on the topic by saying that infants' knowledge is greatly utilized under the guidance of more experienced members including figures or teachers. This concept also suggests that children interact with and analyse the ideas and behaviours they see in their environment. It is suggested that subcultures play an important role in developing skills for cross-cultural success. Vygotsky also emphasizes the importance of language as the foundation of all learning.

Bandura's Social Learning Theory (1977)

Bandura's Social Learning Theory (1977) Social learning theory combines the behavioural and cognitive aspects of learning and aims to provide a comprehensive model that can explain many aspects of educational analysis that occur in the real world. Encouraged by the findings of the Bobo doll experiment, Bandura proposed the principles of education in 1977. This principle was later developed in 1986 into the Social Cognition Principle, which recognizes that learning is social, a constant change and interaction between people, the environment, and behaviour. As Bandura and Walters stated in 1963, the principle becomes moral in nature; however, over the years Bandura moved to a broader perspective, which led to a major revision of the law in 1977. Instead, it was a method of habituating to closeness in the relationship. Learning can occur by observing behaviour and observing the consequences of the behaviour (additional reinforcement). Learning feedback involves inferring facts from observation and determining the effectiveness of behaviour (observational learning or modelling). Therefore, learning can occur without any change in behaviour. Motivation plays a role in learning but is not responsible for learning. Students are not recipients of facts, information, environment, and behaviour interact (parallel decision making).

Empirical Literature

Imoke et al (2024) looked at interactive/Smart Whiteboard and Student-Teachers Academic Performance in Educational Technology at the University of Calabar, Nigeria. This study investigated the effect of the use of interactive or smart whiteboard on student teachers' academic performance in educational technology. Two objectives, research questions and hypotheses were formulated to guide the study. A nonrandomized pre-test post- test experimental design was adopted with a total of 110 second year educational technology students as sample. Educational Technology Performance Test (ETPT) with a reliability co-efficient of 0.75 obtained from Kuder Richardson formula 21 was used in generating data for the study, Descriptive statistics of Mean, Standard Deviation and Analysis of Covariance were used in analysis of data. Findings from the study showed that the use of interactive whiteboard was more effective in enhancing students' performance than the traditional whiteboard. The result also showed that there was no significant difference between the academic performance of male and female students who used the Smart board. Based on the research findings it was recommended that university managements should be encouraged to install Interactive whiteboards in classrooms and teachers should be sent on training on the use of these smart boards for instructional delivery.

Izadpanah (2024) evaluating the impact of smart technology on academic eagerness, academic seriousness, and academic performance in elementary English language learners as a foreign language. The proliferation of smart devices in educational settings has prompted a need to investigate their influence on learners' attitudes and language learning outcomes. Recent advancements in smart technology (ST) have ignited curiosity regarding their impact on academic eagerness (AE), (AS), and academic performance (AP) among elementary English language learners. Despite this, there remains a dearth of comprehensive discussion in this area. This study encompasses all primary language students from the academic year 2023 as its sample. A multistage sampling method was employed for sample selection. The study introduced ST as an intervention over eight 45-minute sessions spanning two months. Data collection instruments included AE assessments adapted from Fredericks et al., an AS questionnaire developed by the researchers, and an AP questionnaire designed by Pham and Taylor. Data analysis incorporated statistical tests such as the Kolmogorov-Smirnov test, Levene test, and univariate analysis of covariance. The findings yield valuable insights into the impact of ST on AE, AS, and AP, shedding light on its potential advantages and limitations in language learning. Notably, the interactive and multimedia features of smart

board not only capture students' attention but also promote a sense of purpose and dedication to academic tasks, emphasizing the need for thoughtful integration aligned with curriculum objectives. The interactive and multimedia features inherent in student enhancing students' academic performance, create engaging learning experiences that capture students' attention and enhance their focus on academic tasks, makes learning more enjoyable, interactive, relevant and effectively promote a sense of purpose and seriousness among learners.

Damola et al (2023) examine the impact of interactive smart board use on technical students' learning outcomes in Nigerian Higher Educational Institutions. The study was carried out to determine the impact of Interactive Smart Board (ISB) usage on technical students' learning outcomes (achievement and motivation). The study adopted a quasi-experimental design and was carried out at First Technical University, Ibadan. The study's population consisted of 276 students enrolled in GST 004, with a sample size of 90. GST 004 was taught using ISB, and a pre-test and post-test were performed. The mean, standard deviation, t-test, and p-value were used to record and interpret the results. A questionnaire was also distributed to assess pupils' motivation. The results showed improved achievement scores and increased levels of motivation by the students who were taught using ISB, compared with those students who use the traditional method only. Results obtained from a pre-test/post-test revealed that students in the experimental group (taught using ISB) had a higher mean achievement score (23.06) and a higher mean gain score (15.27) than the control group (taught using the traditional method; mean achievement score 9.92, mean gain score 7.34). Further results from a motivation questionnaire showed that the experimental group had significantly higher scores than the control group on all three subscales of the questionnaire (Procedural Skills Rating, Interest/Enjoyment, and Perceived Choice), with the highest difference being for the Procedural Skills Rating subscale. The overall motivation score for the experimental group was also much higher than that of the control group. These findings suggest that ISB technologies have the potential to transform educational practices in Nigeria as the country strives to provide students with a quality education that meets the best global standards while also recasting itself as an innovative, efficient, and adaptable economy capable of competing in our modern world.

Gabatshwane et al. (2020) investigate the impact of interactive Smart boards on students' learning in secondary schools in Botswana: A students' perspective. The study is guided by Context Input Process Product (CIPP) Evaluation Model. The study adopts a mixed methods design that employed interviews, observations and a questionnaire to obtain data. The results

show that the use of the SMART boards enabled a variety of learning experiences that promoted students' engagement and interactivity, and increased levels of motivation and improvement in academic achievement. These findings indicate that SMART technologies have the potential to transform educational practices in Botswana, as it endeavours to provide its children with a quality education that matches the best global standards, and simultaneously recasts itself into an innovative, efficient and adaptive economy that can compete in the global world of the 21st century.

Almajali et al (2016). Look at the effectiveness of using smart board for teaching social studies at public schools in Jordan. To achieve the purpose of the study, a pre/post-test was constructed to measure students' level in social studies. The sample of the study consisted of 258 eighth grade students; (120) male students from Marj Al Hamam secondary school for boys and (138) female students from Marj Al Hamam Basic school for girls during the first semester of the academic year 2015/2016. The subjects of the study were distributed into two groups (experimental and control). The experimental group was taught social studies using smart board while the control group was taught using the conventional way. Descriptive statistical analyses were used (means and standard deviation) for the pre and post- tests of students' achievement in social studies. Comparison statistical methods were used (Two Way ANOVA) analysis of variance to make a comparison between the control and the experimental groups and gender variables (male and female). The findings of the study indicated that students' participation in Computer-based instruction helped them to acquire meaningful learning in National Education and also help them to utilized different representations they found in the interactive computer-assisted programs. Smart board facilitating their understanding and also encouraged their conceptual restructuring. In addition, computer based programs encouraged students to use interactive and virtual representations. Therefore, the study recommended that teachers of education programs should take into consideration the use of technology for preparing pre service teachers to teach pronunciation effectively in tomorrow's English classroom.

Ukwueze & Onyia (2014) examine the effect of smartboard on students' achievement in computer studies in Nigerian tertiary institutions. The study was carried out to determine the effect of smart board on student's achievement in word processing. Two research questions guided the study. The study adopted quasi-experimental design and was carried out in University of Nigeria. The population for the study was 990, while the sample was 100. Smart boards were used to determine the effect of teaching word processing on students. The

result showed ISB better achievement by the students when compared with the use of traditional method. Based on the findings, recommendations were made to relevant authorities regarding the effective utilisation of this technology for instructional delivery. From the above literature, none of the study have looked at the impact of digital smart board on students' performance while lecturing economics courses in tertiary institutions in Nigeria. Base on this, the researches tend to carry out this study.

Methodology

The study adopts survey research design to examine the impact of digital smart board on students learning outcome in tertiary institution in Nigeria using economics courses as a case study. Primary and secondary data were employed in the study. The population of this study includes the entire population of Nigeria. Its total population was estimated at 140,003,542 according to 2006 census. With the use of Taro Yamane, the population size was reduced to 400. The research instrument adopt for this study is a self-structured questionnaire titled the impact of digital smart board on students learning outcome while lecturing economics courses in tertiary institution in Nigeria (D.S.B.S.L.L.E.T.I). It enabled the researchers obtained relevant data for the research. The descriptive statistical tools of: tables, percentages, averages and more were used for data presentation. On the other hand, 5 Linkert scale with the use of Mean and Standard Deviation in Statistical Package for Social Science (SPSS) were used in analysing the three research questions. The research questions were analysed using a mean criterion of 3.0 for the research questions, an aggregate mean below 3.0 means the respondents disagree with the stated research question while an aggregate mean of 3.0 and above means the respondents agree with the stated research questions. The questionnaire was designed to elicit information from the respondents, and to suit the need and purpose of the study. The questionnaire was designed in two (2) sections. The first section looked at demographic data of the respondents such as; gender, age and academic qualification. The second analyse the impact of digital smart board on students learning outcome while lecturing economics courses in tertiary institution in Nigeria. The questionnaire adopted a 5-point Likert scale of Strongly agreed (SA), Agreed (A), Undecided (U), Strongly Disagreed (SD), and Disagreed (D). The instrument is made up of a total of 15 items. Purposive sampling techniques were adopted for the study. For the purpose of clarity, two (2) states were selected from each of the four (4) region in Nigeria and one (1) government institutions were selected from each of the selected state. The selected state and

institutions chosen as follow: **Northern Region:** Kano State (University of Zaria) and Abuja (University of Abuja); **Southern Region:** Rivers State (University of Port Harcourt) and Cross River State (University of Calabar); **Eastern Region:** Enugu State (University of Nigeria Nsukka) and Imo State (Federal University of Technology Owerri); **Western Region:** Lagos State (University of Lagos) and Oyo State (University of Ibadan). Purposively, 50 questionnaires were distributed to each of the institution selected among which 10 were distributed to lecturers in Economics department and the remaining 40 were distributed to students' in economics department. The choice of using Purposive sampling techniques in this research work is that it provides non-probability samples which receive selection based on the characteristics which are present within a specific population group and the overall study. It also helps the researcher to identify the extreme perspectives that are present in each population group as well.

Data presentation

The data was presented based on the research objectives. Primary and secondary data were reviewed and questionnaire was distributed based on region, state, selected universities, specific demographic characteristics such as age, gender, marital status and all other demographic variables are calculated using percentages.

Table 1. Regional, State and Institutional Distributions of the Questionnaires

Region	No. of State in Region	Names of State Selected	Names of Tertiary Institutions Selected	No. of Questionnaires Distributed	No. of Questionnaires Returned
Northern	18	Kano	University of Zaria	50	35
		Abuja	University of Abuja	50	38
Southern	6	Rivers	University of Port Harcourt	50	43
		Cross River	University of Calabar	50	37
Eastern	5	Enugu	University of Nigeria	50	41

		Imo	Federal University of Technology Owerri	50	43
Western	7	Lagos	University of Lagos	50	36
		Oyo	University of Ibadan	50	33
				400	**306**

Source: authors compilation (2024)

Table 2. Respondents Socio-demographic characteristics

Socio-Demographic Characteristics	Frequency	Percentage
Gender		
Male	135	44.1
Female	171	55.9
Total	306	100
Status		
Single	202	66.0
Married	104	34.0
Total	306	100
Age Range		
18-30 years	175	57.2
31-43 years	94	30.7
44-56 years	37	12.1
Total	306	100
Highest Educational Qualification		
WAEC	179	58.5
NCE/ND	54	17.6
HND/BSC	42	13.7
MSC/PHD	31	10.1
Total	306	100
Total	306	100

Source: Authors Survey, 2024.

In Table 1 we can see the details of the regional, state and institutional distribution of the population. The population was distributed equally (50) to the two (2) institutions selected from each region which two state was selected from each of these region. Among the 306 respondents, the majority are single accounted for 66.0% of the total. The gender distribution is 171 females (55.9% of the total) and 135 males (44.1% of the total). In terms of age, most respondents are over 18-30years of age; Similarly, when asked about their educational status, the highest respondents have WAEC (58.5%) and the lowest respondents have MSC/PHD which constitute 10.1%.

Data Analysis

In order to determine the appropriateness of the research questions, the data of this study are presented and analysed below using standard deviation, SPSS software and Cronbach alpha correlation test of 0.05 coefficient level.

Research Question

What are the impact of digital smart board on students learning outcome while lecturing economics courses in government tertiary institution in Nigeria?

Table 3. Respondents' views on the impact of digital smart board on students learning outcome while lecturing economics courses in tertiary institution in Nigeria.

S/N	Factors	Mean	Standard Deviation	Decision
1	DSB enhanced student engagement, performance and participation.	**3.5**	**3.3**	**Agreed**
2	Improved understanding of complex economic concepts.	**3.2**	**3.1**	**Agreed**
3	It increased knowledge retention.	**3.9**	**3.8**	**Agreed**
4	Interactive analysis of Nigeria's economic indicators.	**4.2**	**3.9**	**Agreed**
5	Dynamic illustrations of economic models relevant to Nigeria's economy.	**3.8**	**3.5**	**Agreed**
6	It makes it possible for students to have real-time data analysis of Nigerian economic trends.	**3.9**	**3.4**	**Agreed**
7	It enable students to have virtual field trips to Nigerian economic institutions (e.g., Central Bank).	**4.1**	**3.7**	**Agreed**

8	DSB gives students access to Nigerian economic news and current events thereby enabling them access to analyse such news and events.	**3.9**	**3.6**	**Agreed**
9	Helps students to have a better visualization of economic models and theories.	**3.2**	**3.2**	**Agreed**
10	It improves collaborative learning and group work.	**3.8**	**3.6**	**Agreed**
11	Improved teacher-student interaction.	**4.4**	**4.1**	**Agreed**
12	Increased student confidence and motivation.			
13	It makes the teaching of demand and supply curve	**4.3**	**3.9**	**Agreed**
14	interactive.			
15	Simulations of economic scenarios (e.g., inflation, recession).	**3.6**	**3.4**	**Agreed**
	Interactive quizzes and games for economic concepts.			
	Aggregate Mean	**3.8**	**3.9**	**Agreed**

Source: Authors survey, 2024.

Table 3, 1-15. The research question aims to discuss the impacts of digital smart board on students learning outcome while lecturing economics courses in tertiary institution in Nigeria. From table 3 above, it can be deducted that ISB enhanced student engagement, performance and participation, improved understanding of complex economic concepts, increased knowledge retention, encourages interactive analysis of Nigeria's economic indicators, helps in illustrations of economic models relevant to Nigeria's economy, real-time data analysis of Nigerian economic trends, enable students to have virtual field trips to Nigerian economic institutions, enable students' to analyse economic news and events, better visualization of economic models and theories, improves collaborative learning and group work, improved teacher-student interaction, increased student confidence and motivation, makes the teaching of demand and supply curve interactive. The aggregate mean criterion is 3.8 which is above the mean criterion of 3.0 and the aggregate standard deviation is 3.9 which is above the standard deviation of 3.0 indicating that all the respondents anonymously agreed on the impacts of smart board on students learning outcome why lecturing economics courses in tertiary institution in Nigeria.

Discussion of Findings

Responses to the research questions in table 3 revealed the impacts of digital smart board on students learning outcome while lecturing economics courses in tertiary institution in Nigeria. The findings show that DSB enhanced student engagement, performance and participation which is same with the findings of Imoke et al (2024), Izadpanah (2024) & Gabatshwane (2020). Again, the findings also portray that ISB improved understanding of complex concepts, increased knowledge retention and encourages interactive analysis which is in line with the empirical literature of Almajali et al (2016). Also, the study found out that DSB encourages interactive analysis, makes learning interactive, increased student confidence and motivation which is in line with the findings of Imoke et al (2024), Izadpanah (2024), Damola et al (2023) and Ukwueze & Onyia (2014). This study has been able to highlight the impacts of smart board on students learning outcome why lecturing economics courses in tertiary institution in Nigeria.

Conclusion and Recommendations

Conclusion

Digital Smart Board (DSB) is something that has come to stay in this 21st century educational system and has improve students' performance and engagement in learning. By leveraging interactive smart boards, economics educators in Nigerian higher institutions can create an engaging, effective, and personalized learning environment that will enhance Nigeria's student learning outcomes and prepare them for both local and international rapid changing economy.

Recommendation

To maximize the benefits of DSB, lecturers, educators and policymakers in Nigerian higher institutions should prioritize:

1. Integrate interactive smart boards into lesson plans.
2. Provide training and support for lecturers.
3. Monitor student progress and adjust instruction.
4. Encourage student feedback and participation.
5. Ensure technology is used to supplement, not replace, traditional teaching methods.
6. Ensure reliable infrastructure and technical support
7. Integrate interactive smart boards into existing curriculum

8. Develop Nigerian-specific economic digital resources
9. Collaborate with other institutions to share best practices
10. Infrastructure development couple with stable and reliable electricity

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