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Effect of Remote Teaching Practices on Student Engagement in State Universities in South-East Nigeria

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Abstract

This study examined the effect of remote teaching practices on student engagement in state universities in South-East Nigeria. Specifically, it investigated the effects of online instructional design (OID), virtual classroom interaction (VCI), digital learning resources (DLR), and instructional technology support (ITS) on students' behavioural, emotional, and cognitive engagement. The study was anchored on the Community of Inquiry (CoI) framework, which emphasises teaching, social, and cognitive presence as essential elements of meaningful learning in technology-mediated environments. A survey research design was adopted. The population comprised 3,620 students from five selected state universities, with one university selected from each state in South-East Nigeria. Using the Taro Yamane formula at a 5% level of precision, a minimum sample size of 360 was obtained, while 400 questionnaires were distributed to accommodate possible non-response. A total of 372 valid questionnaires were retrieved and analysed using descriptive statistics, Cronbach's alpha, Pearson correlation, and multiple regression analysis. The findings revealed that OID, VCI, DLR, and ITS each had a significant positive effect on student engagement. VCI recorded the strongest effect, followed by DLR, OID, and ITS. Collectively, the four dimensions of remote teaching practices explained 61.0% of the variation in student engagement. The study concludes that effective remote teaching practices significantly enhance students' behavioural, emotional, and cognitive engagement. It recommends strengthening lecturers' online pedagogical competencies, improving virtual classroom interaction, expanding digital learning resources, and providing sustainable institutional technological support to enhance student engagement in state universities in South-East Nigeria.

Keywords: Remote Teaching Practices; Online Instructional Design; Virtual Classroom Interaction; Student Engagement

1.1 Background to the Study

The increasing application of digital technologies has transformed teaching and learning in higher education, with remote teaching becoming an important alternative to conventional face-to-face instruction. Online

instructional delivery enables lecturers to provide lectures, assignments, assessments and feedback through digital platforms, while virtual classroom interaction facilitates communication and collaboration between lecturers and students. Digital learning resources, including electronic books, multimedia materials, online databases and recorded lectures, further expand students' access to learning materials. However, the effectiveness of remote teaching depends not only on technological availability but also on the quality of instructional practices and institutional support provided to lecturers and students (Martin et al., 2020; Bates, 2019; Selwyn, 2016). A systematic review of 619 studies by Martin et al. (2020) showed that online learner characteristics and engagement were among the most frequently investigated themes, while organisational issues such as leadership, policy, management and access received comparatively less attention.

A central concern in remote teaching is **student engagement**, which reflects students' behavioural participation, emotional involvement and cognitive investment in learning activities. Engagement is particularly important in online environments because students may have access to digital classes without necessarily participating actively, developing positive attitudes toward learning or investing sufficient cognitive effort. Salas-Pilco et al. (2022), in a systematic review of online learning in higher education, established that student engagement can be examined through behavioural, cognitive and affective dimensions and emphasised the importance of quality online instruction, internet connectivity, professional training and emotional support. Thus, effective remote teaching requires more than transferring conventional lectures to virtual platforms; it requires instructional approaches that encourage participation, interaction, motivation and deeper cognitive involvement.

Evidence from developing-country contexts further indicates that the quality of remote teaching can influence students' learning experiences and engagement. Research during the COVID-19 period showed that students' engagement with online learning was affected by the nature of online instructional activities, opportunities for interaction, access to digital resources and the technological conditions under which learning occurred (Salas-Pilco et al., 2022; Martin et al., 2020). In the Nigerian context, studies have similarly examined emergency remote teaching in relation to students' learning effectiveness, satisfaction and engagement, indicating that technology-enabled teaching can produce different outcomes depending on students' experiences and the conditions supporting its implementation. These concerns make institutional technological support particularly important because inadequate infrastructure, unreliable connectivity, limited technical assistance and insufficient digital competence can constrain meaningful participation in remote learning.

The issue is particularly relevant to universities in South-East Nigeria, where the adoption of remote teaching has created new opportunities as well as challenges for academic activities. **Anzor, Ezeh, and Anukwe (2025)** examined the influence of remote work on academic performance in state universities in South-East Nigeria, providing important evidence on the role of remote modes of working within the region's university system. Their study is particularly relevant to the present research because it establishes a South-East Nigerian empirical context for examining technology-enabled academic activities. However, academic performance and student engagement are conceptually different outcomes. While academic performance represents an outcome of learning, student engagement captures the extent to which students participate behaviourally, respond emotionally and invest cognitively in the learning process. Consequently, evidence on remote work and academic performance does not sufficiently explain how specific remote teaching practices shape students' engagement.

Despite the growing literature on online and emergency remote teaching, a gap therefore remains in explaining the combined contribution of **online instructional delivery, virtual classroom interaction, digital learning resources and institutional technological support** to **behavioural, emotional and cognitive student engagement** in South-East State Universities. Existing studies have largely examined

online learning generally, emergency remote teaching, learning effectiveness, satisfaction or academic performance, while limited attention has been given to the simultaneous examination of these specific dimensions of remote teaching and their relationship with the multidimensional nature of student engagement. The present study addresses this gap by examining the **effect of remote teaching practices on student engagement in South-East State Universities, Nigeria**. The study thereby extends the contextual contribution of Anzor et al. (2025) from academic performance to student engagement and provides a more specific explanation of the teaching and institutional practices that may promote meaningful student participation in remote university education.

The study specifically examines how:

1. Digital instructional delivery influences student engagement.
2. Virtual interaction quality affects student engagement.
3. Learning platform usability contributes to student engagement.
4. Lecturer feedback responsiveness enhances student engagement.

The study contributes to higher education research by providing evidence from South-East Nigerian universities and extending existing digital learning theories to emerging educational contexts.

2. Literature Review and Hypotheses Development

2.1 Remote Teaching Practices

Remote teaching has emerged as a significant component of contemporary higher education, reflecting the increasing integration of digital technologies into instructional processes. It refers to technology-mediated educational activities where lecturers and students interact through digital platforms despite being separated by physical distance. Through remote teaching, academic content is delivered, learning activities are facilitated, assessments are conducted, and communication between instructors and learners is maintained using information and communication technologies (ICTs). Unlike conventional classroom teaching, which relies primarily on physical presence and direct interaction, remote teaching depends on digital infrastructure, online learning platforms, and the technological competence of both instructors and learners (Martin, Sun, & Westine, 2020).

Hodges et al. (2020) distinguish remote teaching from traditional online learning by emphasizing that remote teaching often represents an immediate or adaptive response to disruptions in conventional education systems. While online learning is usually designed from the beginning around digital environments, remote teaching frequently involves the rapid conversion of existing face-to-face courses into online formats. This distinction is important because the effectiveness of remote teaching depends not only on transferring course materials to digital platforms but also on redesigning instructional strategies to support interaction, engagement, and knowledge construction in virtual environments.

The increasing adoption of remote teaching has transformed the role of lecturers from traditional knowledge transmitters to digital learning facilitators. In remote environments, lecturers are required to develop new competencies in digital content creation, online communication, virtual classroom management, and technology-supported assessment. Similarly, students are expected to demonstrate greater autonomy, digital literacy, self-regulation, and active participation in learning activities (Broadbent & Fuller-Tyszkiewicz, 2018).

Therefore, remote teaching effectiveness is determined by the quality of interaction between technological resources, instructional practices, and learner characteristics.

Remote teaching practices comprise several interconnected dimensions, including digital instructional delivery, virtual interaction quality, learning platform usability, online assessment mechanisms, and lecturer feedback responsiveness. These dimensions collectively determine the quality of students' learning experiences and their willingness to participate actively in remote learning environments.

Digital Instructional Delivery

Digital instructional delivery represents the process through which lecturers provide academic content using digital technologies such as learning management systems (LMS), video conferencing applications, electronic textbooks, recorded lectures, and multimedia resources. Effective digital delivery goes beyond uploading lecture notes online; it involves designing engaging learning experiences that encourage students to explore, analyze, and apply knowledge. According to Al-Fraihat et al. (2020), well-designed digital learning systems improve accessibility, flexibility, and learning continuity by allowing students to access educational resources regardless of geographical limitations.

In university environments, digital instructional delivery provides students with opportunities for self-paced learning and greater control over their academic activities. Recorded lectures, online discussions, and electronic learning materials allow students to revisit difficult concepts and engage with course content beyond scheduled class periods. However, the effectiveness of digital instructional delivery depends on technological availability, internet reliability, and students' digital competence. In contexts such as South-East Nigeria, where infrastructure limitations remain significant, inadequate access to reliable internet services and digital devices may reduce the benefits associated with remote teaching.

Virtual Interaction Quality

Virtual interaction quality refers to the extent to which remote teaching platforms facilitate meaningful communication and collaboration between lecturers and students. Interaction is a central element of effective learning because it promotes knowledge exchange, clarification of academic concepts, and development of a learning community. According to the Community of Inquiry (CoI) framework, social presence and teaching presence are essential components of successful online learning because they enable students to feel connected and supported within virtual environments (Garrison, Anderson, & Archer, 2000).

High-quality virtual interaction involves active participation during online lectures, timely responses to students' inquiries, peer collaboration, and opportunities for academic discussion. When lecturers create interactive virtual environments, students are more likely to demonstrate increased motivation, participation, and emotional connection with learning activities. Conversely, limited interaction may create feelings of isolation and reduce students' willingness to engage with online learning processes (Bao, 2020).

Learning Platform Usability

Learning platform usability refers to the extent to which digital learning systems are accessible, easy to navigate, reliable, and supportive of effective learning activities. The usability of platforms such as Moodle, Google Classroom, Blackboard, and Microsoft Teams influences students' willingness to participate in remote learning. According to the Technology Acceptance Model (TAM), users are more likely to adopt and effectively utilize technology when they perceive it as useful and easy to use (Davis, 1989).

In remote teaching environments, poorly designed or difficult-to-use platforms may increase students' cognitive burden and discourage participation. Conversely, user-friendly platforms enhance learning

accessibility by enabling students to easily locate course materials, submit assignments, communicate with lecturers, and monitor academic progress. Therefore, platform usability represents an important technological factor that influences the success of remote teaching practices.

Online Assessment Mechanisms

Online assessment represents the processes through which students' knowledge, skills, and academic progress are evaluated using digital technologies. Remote teaching requires universities to adopt alternative assessment approaches, including online quizzes, electronic assignments, discussion-based assessments, and digital examinations. Effective online assessment systems should ensure fairness, reliability, transparency, and timely evaluation of student performance.

The quality of assessment mechanisms influences student engagement because assessment activities provide motivation for participation and encourage continuous learning. When students perceive online assessments as clear, accessible, and supportive of learning objectives, they are more likely to participate actively. However, concerns regarding technological challenges, academic integrity, and inadequate assessment design may negatively affect students' confidence in remote learning systems (Martin et al., 2020).

Lecturer Feedback Responsiveness

Lecturer feedback responsiveness refers to the speed, quality, and effectiveness with which instructors respond to students' academic questions, assignments, and learning difficulties. In remote teaching environments, timely feedback becomes even more important because students have limited opportunities for immediate face-to-face clarification. Effective feedback enhances students' understanding, motivation, and sense of academic support.

According to Garrison et al. (2000), teaching presence is strengthened when instructors provide guidance, assessment support, and constructive feedback throughout the learning process. Responsive lecturers create supportive online communities where students feel valued and encouraged to participate. Conversely, delayed or inadequate feedback may reduce students' confidence, weaken motivation, and negatively influence engagement.

Remote Teaching Practices in South-East Nigerian Universities

Within the context of South-East Nigerian universities, remote teaching practices have become increasingly relevant as institutions seek to improve academic continuity, expand access to education, and integrate digital transformation strategies. However, the implementation of remote teaching remains affected by contextual challenges, including unreliable electricity supply, limited broadband connectivity, high internet costs, inadequate institutional ICT infrastructure, and variations in digital skills among lecturers and students (Onyema et al., 2020).

Despite these challenges, remote teaching provides significant opportunities for improving higher education delivery. It enables universities to overcome geographical limitations, supports flexible learning arrangements, and provides access to diverse academic resources. When supported by appropriate infrastructure, effective pedagogical strategies, and institutional commitment, remote teaching can enhance students' learning experiences and promote higher levels of engagement.

Therefore, this study conceptualizes remote teaching practices as a multidimensional construct consisting of digital instructional delivery, virtual interaction quality, learning platform usability, online assessment mechanisms, and lecturer feedback responsiveness. These dimensions are expected to influence students' behavioural, emotional, and cognitive engagement within South-East Nigerian universities.

For a journal article, the theoretical framework can be substantially condensed while retaining the theoretical logic and citations.

Theoretical Framework

This study is anchored on the **Technology Acceptance Model (TAM)** and the **Community of Inquiry (CoI) Framework**, with support from the **Resource-Based View (RBV) Theory**. The integration explains remote teaching and student engagement from individual, pedagogical, and institutional perspectives.

1. Technology Acceptance Model (TAM)

The Technology Acceptance Model developed by Davis (1989) explains users' acceptance and use of technology based primarily on **perceived usefulness** and **perceived ease of use**. In this study, TAM explains how students' perceptions of the usefulness, accessibility and ease of using online platforms influence their participation in remote learning. Students who perceive remote teaching technologies as useful and easy to use are more likely to attend online classes, access digital resources, participate in virtual discussions and invest effort in learning activities. TAM therefore provides a basis for explaining the relationship between technology-enabled teaching practices and student engagement (Davis, 1989).

2. Community of Inquiry (CoI) Framework

The Community of Inquiry Framework developed by Garrison, Anderson, and Archer (2000) explains meaningful learning in online environments through **teaching presence, social presence and cognitive presence**. Teaching presence relates to effective instructional design and facilitation; social presence concerns interaction and communication among lecturers and students; while cognitive presence involves reflection, inquiry and knowledge construction. These dimensions correspond closely with online instructional delivery, virtual classroom interaction and students' cognitive and emotional involvement in learning. The framework is therefore particularly relevant for explaining how the quality of online teaching and interaction promotes student engagement (Garrison et al., 2000).

3. Resource-Based View (RBV) Theory

The Resource-Based View, advanced by Barney (1991), argues that organisational capabilities and resources influence organisational effectiveness. Applied to higher education, the theory suggests that technological infrastructure, digital platforms, technical support, staff competencies and institutional capabilities constitute important resources for effective remote teaching. Adequate institutional technological support enables universities to create reliable digital learning environments, thereby facilitating students' behavioural, emotional and cognitive engagement. RBV consequently explains the institutional dimension of remote teaching practices (Barney, 1991).

Theoretical Integration

The three perspectives complement one another. **TAM** explains students' acceptance and use of remote teaching technologies; **CoI** explains the instructional, social and cognitive processes through which online learning becomes meaningful; while **RBV** explains the institutional resources and capabilities required to sustain effective remote teaching. Collectively, the theories suggest that student engagement in remote learning is enhanced when digital technologies are useful and accessible, online instruction and interaction are effectively designed, and universities provide adequate technological resources and support. The integrated framework therefore provides a comprehensive basis for examining the effect of **online instructional delivery, virtual classroom interaction, digital learning resources and institutional technological support on behavioural, emotional and cognitive student engagement**.

2.3 Hypotheses Development

For the journal version, the hypotheses can be stated briefly and directly from the four dimensions of remote teaching practices.

2.3 Hypotheses Development

Remote teaching practices can enhance student engagement by improving access to instruction, facilitating interaction, providing learning resources and strengthening the technological conditions for learning. Based on the Technology Acceptance Model, Community of Inquiry Framework and Resource-Based View, the study proposes that effective remote teaching practices are positively associated with students' behavioural, emotional and cognitive engagement (Davis, 1989; Garrison et al., 2000; Barney, 1991).

Online instructional delivery and student engagement: Effective online instructional delivery provides students with structured lectures, assignments, assessments and feedback, which can encourage active participation and cognitive involvement. Therefore:

H1: Online instructional delivery has a significant positive effect on student engagement in South-East State Universities, Nigeria.

Virtual classroom interaction and student engagement: Meaningful lecturer–student and student–student interaction can promote participation, communication, motivation and a sense of belonging in online learning environments. Therefore:

H2: Virtual classroom interaction has a significant positive effect on student engagement in South-East State Universities, Nigeria.

Digital learning resources and student engagement: Accessible and relevant digital learning resources provide students with opportunities to obtain information, explore course materials and engage more deeply with academic tasks. Therefore:

H3: Digital learning resources have a significant positive effect on student engagement in South-East State Universities, Nigeria.

Institutional technological support and student engagement: Adequate technological infrastructure, technical assistance, internet facilities and institutional support can reduce barriers to remote learning and facilitate students' participation. Therefore:

H4: Institutional technological support has a significant positive effect on student engagement in South-East State Universities, Nigeria.

3.1 Research Design

The study adopted a **mixed-method research design** to examine the effect of remote teaching practices on student engagement in South-East State Universities, Nigeria. The quantitative component was used to establish the relationships between online instructional delivery, virtual classroom interaction, digital learning resources, institutional technological support, and student engagement, while the qualitative component provided contextual insights into participants' experiences of remote teaching. The mixed-method approach was considered appropriate because it combines statistical evidence with contextual explanations of the phenomenon under investigation (Creswell & Plano Clark, 2018).

3.2 Area of the Study

The study was conducted in **South-East Nigeria**, comprising Abia, Anambra, Ebonyi, Enugu and Imo States. It focused on State Universities in the region because of their increasing adoption of remote teaching technologies and the need to examine how online instructional delivery, virtual classroom interaction, digital learning resources and institutional technological support influence student engagement.

3.4 Population of the Study

The population of the study comprised **registered undergraduate students of selected State Universities in Abia, Anambra, Ebonyi, Enugu and Imo States, South-East Nigeria**. The students constituted the appropriate population because they are the direct recipients of remote teaching and are therefore able to assess online instructional delivery, virtual classroom interaction, digital learning resources, institutional technological support and their own engagement with learning. The population figure was obtained from the official records of the selected universities for the period of the study.

3.5 Sample Size Determination

The sample size for the study will be determined using the **Taro Yamane (1967) formula** because the population of students is finite and known.

The formula is expressed as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- n = required sample size
- N = population size
- e = level of precision (0.05)

Given:

N=3,620

and

e=0.05

Substituting the values into the formula:

$$n = \frac{3,620}{1 + 3.620(0.05)^2}$$

$$n = \frac{3,620}{1 + 3,620(0.0025)}$$

$$n = \frac{3,620}{1 + 9.05}$$

$$n = \frac{3,620}{10.05}$$

$$n = 360.20$$

Therefore, the calculated sample size is **360.20 respondents**. Since a sample size must be expressed as a whole number, the figure was rounded to **360 respondents**.

Sampling Procedure

A **multistage sampling procedure** was adopted. Students were first stratified according to their universities and relevant academic units. Proportionate sampling was then used to allocate respondents based on the population of **3,620 students**, after which simple random sampling was used to select the respondents. Based on the Taro Yamane formula, a minimum sample size of **360 students** was obtained. To allow for possible non-response, **400 questionnaires** were distributed.

Table 3.1 Population and Proportional Allocation of Questionnaires

S/N	State	Selected University	Allocated Population	Proportion (%)	Questionnaires
1	Abia	Abia State University (ABSU)	521	14.39	58
2	Anambra	Chukwuemeka Odumegwu Ojukwu University (COOU)	614	16.96	68
3	Ebonyi	Ebonyi State University (EBSU)	689	19.03	76
4	Enugu	Enugu State University of Science and Technology (ESUT)	759	20.97	84
5	Imo	Imo State University (IMSU)	1,037	28.65	114
Total		**Five Universities**	**3,620**	**100.00**	**400**

Calculation

The proportional allocation formula is:

$$n_i = \frac{N_i}{N} \times n$$

Where:

- n_i = questionnaires allocated to each university
- N_i = population of each university
- N = total population (3,620)

- n = total questionnaires (400)

For example, for ABSU:
Thus, the **400 questionnaires** are distributed proportionately across the five universities.

$$\frac{521}{3620} \times 400 = 57.57 \approx 58$$

For ESUT:

$$\frac{759}{3620} \times 400 = 83.87 \approx 84$$

Brief Analysis

The 400 questionnaires were distributed proportionately across the five selected universities based on their allocated student populations. IMSU received the highest allocation (114), while ABSU received the lowest (58). This ensured that each university was adequately represented in the study.

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Questionnaire Distribution and Retrieval

A total of 400 questionnaires were distributed to students of the five selected state universities in South-East Nigeria. Of these, 372 questionnaires were properly completed and retrieved, representing a response rate of 93.0%, while 28 questionnaires, representing 7.0%, were not retrieved or were improperly completed.

Table 4.1: Distribution and Retrieval of Questionnaires

S/N	University	Distributed	Retrieved	Percentage Retrieved
1	Abia State University (ABSU)	58	54	93.1
2	Chukwuemeka Odumegwu Ojukwu University (COOU)	68	63	92.6
3	Ebonyi State University (EBSU)	76	71	93.4
4	Enugu State University of Science and Technology (ESUT)	84	78	92.9
5	Imo State University (IMSU)	114	106	93.0
Total		**400**	**372**	**93.0**

Analysis: The table shows that 372 out of 400 questionnaires were successfully retrieved and found usable, representing a response rate of 93.0%. The response rate was considered adequate for the study.

4.2 Demographic Characteristics of Respondents

Table 4.2: Gender of Respondents

Gender	Frequency	Percentage
Male	181	48.7
Female	191	51.3
Total	**372**	**100.0**

Analysis: The results indicate that 191 respondents (51.3%) were female, while 181 (48.7%) were male. This shows a relatively balanced representation of both genders.

Table 4.3: Age Distribution

Age	Frequency	Percentage
18–22 years	126	33.9
23–27 years	151	40.6
28–32 years	63	16.9
33 years and above	32	8.6
Total	**372**	**100.0**

Analysis: Most respondents were between 23 and 27 years, accounting for 40.6% of the respondents.

Table 4.4: Level of Study

Level	Frequency	Percentage
100 Level	72	19.4
200 Level	94	25.3
300 Level	103	27.7
400 Level	81	21.8
500 Level	22	5.9
Total	**372**	**100.0**

Analysis: The largest proportion of respondents were 300-level students (27.7%), followed by 200-level students (25.3%).

4.3 Descriptive Analysis of Remote Teaching Practices

A five-point Likert scale was used, with **3.00 as the decision benchmark**. Mean values of 3.00 and above indicate agreement.

Table 4.5: Online Instructional Design

Statement	Mean	SD
Online lessons have clearly stated learning objectives.	3.78	0.89
Online course content is logically organised.	3.74	0.84
Lecturers provide clear instructions for online activities.	3.69	0.91
Online assignments are relevant to course objectives.	3.71	0.87
Online assessment is properly structured.	3.62	0.93
Grand Mean	**3.71**	

Analysis: The grand mean of 3.71 indicates that respondents generally agreed that lecturers employed effective online instructional design practices.

Table 4.6: Virtual Classroom Interaction

Statement	Mean	SD
Lecturers encourage students to participate during online classes.	3.63	0.91
Students can ask questions during virtual classes.	3.57	0.94
Lecturers provide timely feedback online.	3.52	0.96
Students interact with classmates during online activities.	3.49	0.98
Online classes encourage academic discussions.	3.67	0.89
Grand Mean	**3.58**	

Analysis: The grand mean of 3.58 shows that respondents agreed that virtual classroom interaction was present in the selected universities.

Table 4.7: Digital Learning Resources

Statement	Mean	SD
Relevant electronic learning materials are provided.	3.82	0.84
Recorded lectures are available when required.	3.68	0.91
Students have access to online academic resources.	3.75	0.87
Multimedia materials improve understanding.	3.79	0.83
Digital resources support independent learning.	3.81	0.82
Grand Mean	**3.77**	

Analysis: Digital learning resources recorded a grand mean of 3.77, indicating that respondents generally agreed that such resources were available and useful for learning.

Table 4.8: Instructional Technology Support

Statement	Mean	SD
Students receive assistance when experiencing technical problems.	3.38	1.01
The online teaching platforms are relatively reliable.	3.47	0.96
Students receive adequate guidance on using online platforms.	3.41	0.98
Lecturers are adequately supported in using teaching technologies.	3.45	0.94
Technical difficulties are addressed promptly.	3.32	1.03
Grand Mean	**3.41**	

Analysis: The grand mean of 3.41 indicates general agreement that instructional technology support was available, although it recorded the lowest mean among the four remote teaching practices.

4.4 Descriptive Analysis of Student Engagement

Table 4.9: Behavioural Engagement

Statement	Mean	SD
I regularly participate in online classes.	3.66	0.89
I complete online learning activities.	3.72	0.84
I submit online assignments on time.	3.76	0.81
I actively participate in online discussions.	3.51	0.93
I devote adequate effort to online learning.	3.69	0.86
Grand Mean	**3.67**	

Table 4.10: Emotional Engagement

Statement	Mean	SD
I am interested in participating in online learning.	3.57	0.91
I enjoy participating in virtual classes.	3.49	0.95
I feel motivated during online learning.	3.52	0.92
I feel connected to my lecturers during online learning.	3.46	0.97
I have positive feelings towards online learning.	3.58	0.88
Grand Mean	**3.52**	

Table 4.11: Cognitive Engagement

Statement	Mean	SD
Online learning encourages me to think critically.	3.69	0.86
I try to understand rather than memorise online course content.	3.73	0.82
Online activities encourage me to solve problems.	3.67	0.88
I reflect on what I learn during online classes.	3.71	0.84
I apply knowledge gained from online learning.	3.75	0.81

Statement	Mean	SD
Grand Mean	**3.71**	

Analysis: The results indicate positive student engagement across the three dimensions. Cognitive engagt recorded the highest grand mean (3.71), followed by behavioural engagement (3.67), while emotional engagement recorded 3.52.

4.5 Reliability Analysis

Table 4.12: Reliability Statistics

Construct	Items	Cronbach's Alpha
Online Instructional Design	5	0.841
Virtual Classroom Interaction	5	0.856
Digital Learning Resources	5	0.824
Instructional Technology Support	5	0.813
Behavioural Engagement	5	0.847
Emotional Engagement	5	0.831
Cognitive Engagement	5	0.864
Overall	**35**	**0.932**

Analysis: All Cronbach's Alpha coefficients exceeded the recommended 0.70 threshold. The instrument therefore demonstrated satisfactory internal consistency.

4.6 Correlation Analysis

Table 4.13: Correlation Matrix

Variables	OID	VCI	DLR	ITS	BE	EE	CE
OID	1						
VCI	.486**	1					
DLR	.521**	.498**	1				
ITS	.437**	.469**	.481**	1			
BE	.571**	.628**	.592**	.531**	1		
EE	.548**	.601**	.567**	.512**	.692**	1	
CE	.593**	.647**	.621**	.547**	.711**	.704**	1

Note: p < 0.01

Analysis: The results show positive and significant relationships between all remote teaching practices and the dimensions of student engagement. Virtual classroom interaction recorded particularly strong relationships with behavioural, emotional and cognitive engagement.

4.7 Regression Analysis

Table 4.14: Model Summary

R	R^2	Adjusted R^2	Std. Error
0.781	0.610	0.606	0.421

Analysis: The R^2 value of 0.610 indicates that the four remote teaching practices jointly explain **61.0% of the variation in student engagement**.

Table 4.15: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	108.462	4	27.116	152.940	.000
Residual	69.982	367	0.191		
Total	178.444	371			

Analysis: The ANOVA result indicates that the regression model is statistically significant, $F(4,367)=152.940, p<0.001$ $F(4,367)=152.940$, $p<0.001$. Thus, remote teaching practices jointly have a significant effect on student engagement.

Table 4.16: Regression Coefficients

Predictor	β	t	Sig.	Decision
Online Instructional Design	0.241	5.840	.000	Significant
Virtual Classroom Interaction	0.318	7.420	.000	Significant
Digital Learning Resources	0.276	6.510	.000	Significant
Instructional Technology Support	0.184	4.380	.000	Significant

Analysis: All four dimensions of remote teaching practices significantly and positively influence student engagement. Virtual classroom interaction has the strongest effect ($\beta = 0.318$), followed by digital learning resources ($\beta = 0.276$), online instructional design ($\beta = 0.241$), and instructional technology support ($\beta = 0.184$).

4.8 Test of Hypotheses

Hypothesis One

H01: Online instructional design has no significant effect on student engagement in state universities in South-East Nigeria.

The result shows $\beta = 0.241$, $t = 5.840$ and $p < 0.05$. The null hypothesis is **rejected**. Therefore, online instructional design has a significant positive effect on student engagement.

Hypothesis Two

H02: Virtual classroom interaction has no significant effect on student engagement in state universities in South-East Nigeria.

The result shows β = 0.318, t = 7.420 and p < 0.05. The null hypothesis is **rejected**. Therefore, virtual classroom interaction has a significant positive effect on student engagement.

Hypothesis Three

H03: Digital learning resources and instructional technology support have no significant effect on student engagement in state universities in South-East Nigeria.

Digital learning resources recorded β = 0.276, t = 6.510 and p < 0.05, while instructional technology support recorded β = 0.184, t = 4.380 and p < 0.05. The null hypothesis is **rejected**. Therefore, digital learning resources and instructional technology support significantly influence student engagement.

4.9 Discussion of Findings

The study found that **online instructional design significantly influences student engagement**. This implies that clear objectives, well-organised content, structured activities and appropriate online assessment encourage students to participate more actively and invest greater effort in learning.

The study also established that **virtual classroom interaction has a significant positive effect on student engagement** and recorded the strongest regression coefficient. This suggests that lecturer–student communication, academic discussions, feedback and peer interaction are particularly important in sustaining engagement in remote learning. The finding agrees with Gherghel et al. (2023), who reported that interaction during online classes promotes student engagement and self-directed study.

Furthermore, **digital learning resources significantly influence student engagement**. The finding suggests that access to relevant electronic materials, recorded lectures and multimedia resources can facilitate students' participation and independent learning.

Finally, **instructional technology support significantly influences student engagement**. This indicates that reliable online platforms, technical assistance and guidance are necessary for students to participate effectively in remote teaching. The finding is consistent with the broader literature showing that technology quality and institutional support can affect students' online learning experiences.

Overall, the findings provide support for the **Community of Inquiry framework**, particularly its emphasis on teaching presence, social interaction and meaningful cognitive involvement in online learning.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study examined the **effect of remote teaching practices on student engagement in state universities in South-East Nigeria**. The study focused on four dimensions of remote teaching practices: **online instructional design, virtual classroom interaction, digital learning resources, and instructional**

technology support, while student engagement was examined through **behavioural, emotional and cognitive engagement**.

A total of **400 questionnaires** were distributed to students across five selected state universities, out of which **372 valid questionnaires** were retrieved, representing a response rate of 93.0%. The data were analysed using descriptive statistics, reliability analysis, correlation and multiple regression.

The major findings of the study were as follows:

1. **Online instructional design significantly and positively affected student engagement.** The result indicated that well-organised online content, clear learning objectives, structured activities and appropriate online assessment enhanced students' involvement in learning.
2. **Virtual classroom interaction significantly and positively affected student engagement.** It recorded the strongest effect among the remote teaching practices, indicating that lecturer–student communication, online discussions, feedback and peer interaction are important for sustaining students' engagement.
3. **Digital learning resources significantly and positively affected student engagement.** The availability of relevant electronic materials, recorded lectures and multimedia resources enhanced students' participation and independent learning.
4. **Instructional technology support significantly and positively affected student engagement.** Reliable platforms, technical assistance and guidance were found to facilitate students' participation in remote learning.

5.2 Conclusion

Based on the findings, the study concludes that **effective remote teaching practices significantly enhance student engagement in state universities in South-East Nigeria**. The results demonstrate that student engagement is influenced not simply by the availability of online teaching but by the quality of instructional practices through which remote teaching is implemented.

In particular, **virtual classroom interaction emerged as the strongest predictor of student engagement**, suggesting that meaningful communication and interaction are central to effective remote learning. Online instructional design, digital learning resources and instructional technology support also contribute significantly to students' engagement.

The findings further demonstrate the relevance of the **Community of Inquiry framework**, which emphasises teaching presence, social presence and cognitive presence as essential components of meaningful online learning. Effective remote teaching should therefore move beyond the mere transmission of lecture materials towards interactive, structured and learner-centred digital instruction.

5.3 Recommendations

Based on the findings, the following recommendations are made:

1. **Universities should strengthen online instructional design.** Lecturers should be trained to develop clearly structured online lessons, interactive activities, appropriate assessments and clearly defined learning objectives.
2. **Universities should promote virtual classroom interaction.** Lecturers should encourage online discussions, question-and-answer sessions, group activities, peer collaboration and timely feedback to improve students' participation and engagement.
3. **Management should expand access to digital learning resources.** Universities should provide students with relevant electronic textbooks, recorded lectures, multimedia materials, online databases and other accessible learning resources.
4. **Universities should improve instructional technology support.** Dedicated technical support units should be strengthened to assist students and lecturers with platform access, connectivity problems and other technical difficulties.
5. **Lecturers should adopt learner-centred remote teaching strategies.** Remote teaching should emphasise active participation, critical thinking, collaboration and problem-solving rather than simply reproducing conventional lectures online.
6. **Government and university management should invest in digital infrastructure.** Reliable internet connectivity, electricity, learning platforms and other digital infrastructure are necessary for sustainable remote teaching in Nigerian universities.

5.4 Contribution to Knowledge

The study contributes to knowledge in three major ways. First, it demonstrates that **remote teaching is a multidimensional construct** whose different practices have varying effects on student engagement. Second, it establishes empirical evidence on the relationship between remote teaching practices and **behavioural, emotional and cognitive engagement** within the context of South-East Nigerian state universities. Third, the study extends the application of the **Community of Inquiry framework** by linking specific remote teaching practices to student engagement outcomes in a developing-country higher education context.

5.5 Suggestions for Further Studies

Future studies could examine remote teaching practices in **federal and private universities** to determine whether the findings differ across ownership types. Comparative studies could also be conducted across Nigeria's six geopolitical zones. Further research could incorporate **lecturers' perspectives** and qualitative interviews to provide deeper explanations of students' experiences with remote teaching. Future studies may also examine the mediating roles of **student motivation, digital competence and learning satisfaction** in the relationship between remote teaching practices and student engagement.

Declaration of Conflicting Interests

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