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Interactive Digital Classroom Tools and Effective Instructional Delivery in Rivers State Owned Universities

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ABSTRACT

The study investigated educational management lecturers' utilization of interactive digital classroom tools for effective instructional delivery in Rivers State owned universities, with attention to piazza, the interactive whiteboard and interactive video conferencing. Three research questions and three null hypotheses guided the study. The descriptive survey research design was adopted. The population of the study comprised 85 lecturers in the Department of Educational Management, consisting of 43 lecturers in Rivers State University and 42 lecturers in Ignatius Ajuru University of Education, and the entire population was studied without sampling owing to its small and manageable size. The instrument for data collection was a questionnaire tagged "Lecturers' Utilization of Digital Classroom Tools for Effective Instructional Delivery Questionnaire", structured on the four-point summated rating scale response options of very high extent, high extent, low extent and very low extent. The face and content validity of the questionnaire was established by three experts in Educational Management and in Measurement and Evaluation, and its reliability was determined through the test-retest method, with the Pearson Product Moment Correlation Coefficient yielding a reliability index of 0.80. All 85 copies of the questionnaire administered were retrieved and used for the study. Mean and standard deviation were used to answer the research questions while the z-test was used to test the null hypotheses at the 0.05 level of significance. The study found that lecturers' utilization of piazza, the interactive whiteboard and interactive video conferencing enhances effective instructional delivery to a high extent, with aggregate mean scores of 2.77 and 2.71, 2.74 and 2.73, and 2.76 and 2.77 respectively, and that lecturers in the two universities did not differ significantly in their ratings on any of the three tools. It was recommended among others that departments should adopt a discussion platform such as piazza for every course, so that questions raised outside the lecture period receive timely response.

Introduction

Instruction in the university classroom depends as much on exchange as on presentation, since students who ask questions, argue positions and receive prompt response learn more securely than those who only listen. The digital tools now available differ considerably in how far they support that exchange, and the ones examined in this study are distinguished precisely by their interactive character, in that each of them is designed to carry communication in both directions rather than to deliver content in one. McGarr (2018) observed that tools of this kind alter the relationship between teacher and learner rather than merely the means of delivery, which is what marks them out from the devices and repositories that serve chiefly to store and present material.

Effective instructional delivery refers to the successful transmission of knowledge, skills and values in a manner that engages learners and produces the outcomes a course intends. Amangala (2025) established in a study of digital classroom tools in public universities in Rivers State that the tools which sustain interaction contribute most visibly to that engagement, while Nwuke and Ucheju (2021) reported that the availability and utilization of instructional facilities in Rivers State institutions vary widely and that utilization rather than availability is the binding constraint. Ehule and Wordu (2025) argued in the same context that the revitalisation of educational management practice depends substantially on the deliberate adoption of such tools.

Three interactive tools form the concern of this study. Piazza is a question-and-answer platform on which students post queries and contribute to discussion at their own convenience, and on which lecturers and fellow students respond, so that the exchange of a seminar continues beyond its scheduled hour. The interactive whiteboard places multimedia content before the whole class in a form that can be annotated, manipulated and saved during the lesson itself, allowing collaborative work at the front of the room rather than passive viewing. Interactive video conferencing carries the lesson itself across distance, enabling participants to see and hear one another as though they occupied the same room, and so removing the requirement of physical presence that has long limited who can attend. Adoption of such tools is uneven in practice, and Amadi and Gwarah (2025) reported in their study of educational management lecturers in Rivers State owned universities that uptake was strongest where a tool supported an activity lecturers already carried out, which bears directly on how interactive platforms are likely to be received.

The Department of Educational Management in the two Rivers State owned universities provides a suitable setting for examining these tools, since its lecturers teach the management of resources of precisely this kind and its students are drawn from across the state and beyond. What has not been established is the extent to which lecturers in the two universities utilize piazza, the interactive whiteboard and interactive video conferencing for effective instructional delivery, and whether their ratings differ by institution. This study therefore examined those questions. Availability alone settles little, since Taylor et al. (2025) found among educators in these same two universities that awareness of digital tools exceeded their actual adoption, so that the extent of utilisation has to be established directly rather than inferred from provision.

Statement of the Problem

Instructional delivery in Rivers State owned universities is constrained by conditions that limit exchange between lecturer and student. Classes are large enough that few students can ask questions within the period, contact hours are frequently lost to disruptions of the academic calendar, and students who live at a distance from campus or who cannot attend on a given day have no means of taking part in the lesson they miss. The result is that teaching proceeds largely in one direction, with content presented and received rather than discussed.

Interactive digital classroom tools were developed to address exactly this limitation, since a discussion platform allows questions to be raised and answered outside the lecture period, an interactive whiteboard permits work to be done collaboratively at the front of the classroom, and video conferencing removes the requirement of physical presence altogether. In the Department of Educational Management in the two state-owned universities, however, these tools are used at the discretion of individual lecturers, and no departmental arrangement determines whether a course maintains a discussion platform, whether lessons make use of the whiteboards installed, or whether classes are available to those who cannot attend in person. The extent to which lecturers actually utilize these tools has not been established, nor is it known whether the two universities differ in their utilization, and without such evidence the institutions cannot judge where provision or training would improve instruction most. The question now is, to what extent does educational management lecturers' utilization of piazza, the interactive whiteboard and interactive video conferencing enhance effective instructional delivery in Rivers State owned universities? Providing answers to this question is the problem of this study.

Purpose of the Study

The purpose of this study was to investigate educational management lecturers' utilization of interactive digital classroom tools for effective instructional delivery in Rivers State owned universities. Specifically, the study sought to:

1. determine the extent to which educational management lecturers' utilization of piazza as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.
2. examine the extent to which educational management lecturers' utilization of the interactive whiteboard as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.
3. ascertain the extent to which educational management lecturers' utilization of interactive video conferencing as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

Research Questions

1. To what extent does educational management lecturers' utilization of piazza as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?
2. To what extent does educational management lecturers' utilization of interactive whiteboard as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?
3. To what extent does educational management lecturers' utilization of interactive video conferencing as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?

Hypotheses

HO1: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of piazza as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

HO2: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of interactive whiteboard as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

HO3: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of interactive video conferencing as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

Methodology

The study adopted the descriptive survey research design, which involves the collection of data on, and the systematic description of, the characteristics, features or facts about a given population. The design was appropriate for the study because it involved the collection of data from lecturers in order to investigate the extent to which their utilization of piazza, the interactive whiteboard and interactive video conferencing as digital classroom tools enhances effective instructional delivery in Rivers State owned universities. The study was conducted in Rivers State, which lies in the South-South geopolitical zone of Nigeria and hosts the two universities owned by the state government, namely Rivers State University and Ignatius Ajuru University of Education.

The population of the study comprised 85 lecturers in the Department of Educational Management, consisting of 43 lecturers in Rivers State University and 42 lecturers in Ignatius Ajuru University of Education, and the figures were obtained from the offices of the Heads of Department of the two universities. The entire population was studied without sampling owing to its small and manageable size, so that the sample of the study was the 85 lecturers themselves. The instrument for data collection was a questionnaire developed by the researcher and tagged "Lecturers' Utilization of Digital Classroom Tools for Effective Instructional Delivery Questionnaire (LUDCTEIDQ)", which was in two parts, with Part A generating the demographic information of the respondents while Part B sought information on the digital classroom tools under study. The questionnaire was structured in line with the four-point modified rating scale response options of Very High Extent (VHE) = 4 points, High Extent (HE) = 3 points, Low Extent (LE) = 2 points and Very Low Extent (VLE) = 1 point.

To establish the face and content validity of the instrument, the research objectives and the questionnaire were given to three experts in Educational Management and in Measurement and Evaluation in the Faculty of Education, Rivers State University, whose comments, suggestions and corrections were used to improve the instrument before the final copies were produced. The reliability of the instrument was established through the test-retest method, in which 20 copies were administered to 20 lecturers in the Department of Educational Management in the University of Port Harcourt and the same instrument re-administered on the same lecturers after two weeks, with the responses collated and analysed using the Pearson Product Moment Correlation Coefficient, which yielded a reliability index of 0.80.

The researcher administered 85 copies of the questionnaire to the respondents, made up of 43 lecturers in Rivers State University and 42 lecturers in Ignatius Ajuru University of Education, with the help of two research assistants who were briefed on how to administer and retrieve the instrument, and the exercise lasted three weeks. All 85 copies administered were retrieved and used for the study, representing a retrieval rate of 100%. Mean and standard deviation were used to answer the research questions, with values from 3.50 to 4.00 regarded as Very High Extent, from 2.50 to 3.49 as High Extent, from 1.50 to 2.49 as Low Extent and from 0.50 to 1.49 as Very Low Extent, while the z-test was used to test the null hypotheses at the 0.05 level of significance, such that a null hypothesis was accepted where the calculated z-value was less than the critical z-value of ±1.96 and rejected where it was greater.

Analyses of Data and Results

Research Question 1: To what extent does educational management lecturers' utilization of piazza as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?

Table 1: Mean ratings and standard deviation of RSU and IAUE lecturers on the extent to which their utilization of piazza as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities

S/N	Questionnaire Items	RSU Lecturers (N = 43)		Remarks	IAUE Lecturers (N = 42)		Remarks
		$\bar{X}_1$	SD_1		$\bar{X}_2$	SD_2	
16.	Educational management lecturers' use of piazza in teaching enables students to contribute to course discussions at their own convenience using various devices.	2.79	1.06	High Extent	2.83	1.06	High Extent
17.	Educational management lecturers' use of piazza in teaching enables students to explore diverse resources tailored to their individual learning preferences.	2.72	1.12	High Extent	2.62	1.13	High Extent
18.	Educational management lecturers' use of piazza in the classroom helps students see alternative viewpoints and clarify their thinking.	2.77	1.11	High Extent	2.64	1.12	High Extent
19.	Educational management lecturers' use of piazza in teaching helps students absorb information more effectively and retain it for effective learning.	2.81	1.05	High Extent	2.67	1.12	High Extent
20.	Educational management lecturers' use of piazza in instructing students enables them to review participation patterns and adjust their teaching strategies.	2.77	1.09	High Extent	2.79	1.05	High Extent
	Aggregate $\bar{X}$/SD	**2.77**	**1.09**		**2.71**	**1.10**	

Source: Researcher's Field Study (2026)

Table 1 shows that all the five items had mean ratings within the range of high extent for both groups of respondents, with an aggregate mean of 2.77 and standard deviation of 1.09 for lecturers in Rivers State University and an aggregate mean of 2.71 and standard deviation of 1.10 for lecturers in Ignatius Ajuru University of Education. This indicates that educational management lecturers' utilization of piazza as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities to a high extent in all the ways stated.

Research Question 2: To what extent does educational management lecturers' utilization of interactive whiteboard as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?

Table 2: Mean ratings and standard deviation of RSU and IAUE lecturers on the extent to which their utilization of interactive whiteboard as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities

S/N	Questionnaire Items	RSU Lecturers (N = 43)		Remarks	IAUE Lecturers (N = 42)		Remarks
		$\bar{X}_1$	SD_1		$\bar{X}_2$	SD_2	
21.	Educational management lecturers' use of interactive whiteboard in teaching enables students to work together and engage more deeply in the lessons.	2.74	1.14	High Extent	2.81	1.06	High Extent
22.	Educational management lecturers' use of interactive whiteboard in the classroom enables them to create a student-centred learning environment that improves motivation.	2.77	1.09	High Extent	2.79	1.09	High Extent
23.	Educational management lecturers' use of interactive whiteboard in the classroom enhances collaboration and interactivity that leads to improved students' learning.	2.74	1.07	High Extent	2.74	1.08	High Extent
24.	Educational management lecturers' use of interactive whiteboard in teaching enables them to display multimedia contents that engage students in interactive lessons.	2.72	1.12	High Extent	2.71	1.11	High Extent
25.	Educational management lecturers' use of interactive whiteboard in the classroom supports the presentation of ideas in forms that students can follow and question during the lesson.	2.72	1.08	High Extent	2.64	1.12	High Extent
	Aggregate $\bar{X}$/SD	**2.74**	**1.10**		**2.73**	**1.09**	

Source: Researcher's Field Study (2026)

Table 2 shows that all the five items had mean ratings within the range of high extent for both groups of respondents, with an aggregate mean of 2.74 and standard deviation of 1.10 for lecturers in Rivers State University and an aggregate mean of 2.73 and standard deviation of 1.09 for lecturers in Ignatius Ajuru University of Education. This indicates that educational management lecturers' utilization of the interactive whiteboard as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities to a high extent in all the ways stated.

Research Question 3: To what extent does educational management lecturers' utilization of interactive video conferencing as a digital classroom tool enhance effective instructional delivery in Rivers State owned universities?

Table 3: Mean ratings and standard deviation of RSU and IAUE lecturers on the extent to which their utilization of interactive video conferencing as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities

S/N	Questionnaire Items	RSU Lecturers (N = 43)		Remarks	IAUE Lecturers (N = 42)		Remarks
		$\bar{X}_1$	SD_1		$\bar{X}_2$	SD_2	
26.	Educational management lecturers' use of interactive video conferencing during teaching enables participants to interact visually and audibly as if they are in the same physical space.	2.79	1.08	High Extent	2.81	1.06	High Extent
27.	Educational management lecturers' use of interactive video conferencing in teaching enables them to break down the barriers of distance, enhancing the immediacy of instructional delivery.	2.77	1.09	High Extent	2.79	1.09	High Extent
28.	Educational management lecturers' use of interactive video conferencing in instructing students enables students to engage actively in discussions which enhance their understanding of complex topics.	2.74	1.11	High Extent	2.76	1.10	High Extent

S/N	Questionnaire Items	RSU Lecturers (N = 43)		Remarks	IAUE Lecturers (N = 42)		Remarks
		$\bar{X}_1$	SD_1		$\bar{X}_2$	SD_2	
29.	Educational management lecturers' use of interactive video conferencing in teaching enables students to attend classes in a manner that facilitates a personalized learning experience suited to their needs and circumstances.	2.74	1.07	High Extent	2.76	1.08	High Extent
30.	Educational management lecturers' use of interactive video conferencing in teaching enables them to incorporate interactive simulations into their lessons that cater to various students' learning preferences.	2.77	1.13	High Extent	2.71	1.11	High Extent
	Aggregate $\bar{X}$/SD	**2.76**	**1.10**		**2.77**	**1.09**	

Source: Researcher's Field Study (2026)

Table 3 shows that all the five items had mean ratings within the range of high extent for both groups of respondents, with an aggregate mean of 2.76 and standard deviation of 1.10 for lecturers in Rivers State University and an aggregate mean of 2.77 and standard deviation of 1.09 for lecturers in Ignatius Ajuru University of Education, this being the only tool on which the ratings of lecturers in Ignatius Ajuru University of Education exceeded those of their counterparts. This indicates that educational management lecturers' utilization of interactive video conferencing as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities to a high extent in all the ways stated.

Hypotheses

HO1: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of piazza as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

Table 4: Summary of z-test analysis of difference in the mean ratings of RSU and IAUE lecturers on the utilization of piazza as a digital classroom tool

Respondents	N	$\bar{X}$	SD	DF	Level of Sign.	z-Cal	z-Crit.	Decision
RSU Lecturers	43	2.77	1.09	83	0.05	0.25	±1.96	Ho1 Accepted
IAUE Lecturers	42	2.71	1.10					

Source: Researcher's Field Study (2026)

Table 4 shows a calculated z-value of 0.25 which is less than the critical z-value of ±1.96 at 83 degrees of freedom and 0.05 level of significance. The null hypothesis was therefore accepted, indicating that there is no significant difference in the mean ratings of lecturers in the two universities on the extent to which their utilization of piazza enhances effective instructional delivery.

HO2: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of interactive whiteboard as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

Table 5: Summary of z-test analysis of difference in the mean ratings of RSU and IAUE lecturers on the utilization of interactive whiteboard as a digital classroom tool

Respondents	N	$\bar{X}$	SD	DF	Level of Sign.	z-Cal	z-Crit.	Decision
RSU Lecturers	43	2.74	1.10	83	0.05	0.04	±1.96	Ho2 Accepted
IAUE Lecturers	42	2.73	1.09					

Source: Researcher's Field Study (2026)

Table 5 shows a calculated z-value of 0.04 which is less than the critical z-value of ±1.96 at 83 degrees of freedom and 0.05 level of significance. The null hypothesis was therefore accepted, indicating that there is no significant difference in the mean ratings of lecturers in the two universities on the extent to which their utilization of the interactive whiteboard enhances effective instructional delivery.

HO3: There is no significant difference in the mean ratings of lecturers in Rivers State University and Ignatius Ajuru University of Education on the extent to which their utilization of

interactive video conferencing as a digital classroom tool enhances effective instructional delivery in Rivers State owned universities.

Table 6: Summary of z-test analysis of difference in the mean ratings of RSU and IAUE lecturers on the utilization of interactive video conferencing as a digital classroom tool

Respondents	N	X̄	SD	DF	Level of Sign.	z-Cal	z-Crit.	Decision
RSU Lecturers	43	2.76	1.10	83	0.05	-0.04	±1.96	Ho3 Accepted
IAUE Lecturers	42	2.77	1.09					

Source: Researcher's Field Study (2026)

Table 6 shows a calculated z-value of -0.04 whose absolute value is less than the critical z-value of ±1.96 at 83 degrees of freedom and 0.05 level of significance. The null hypothesis was therefore accepted, indicating that there is no significant difference in the mean ratings of lecturers in the two universities on the extent to which their utilization of interactive video conferencing enhances effective instructional delivery.

Discussion of Findings

Findings on research question 1 on Table 1 revealed that lecturers' utilization of piazza enhances effective instructional delivery to a high extent, with aggregate mean scores of 2.77 and 2.71, the widest divergence between the two universities recorded in this study. Hypothesis 1 on Table 4 showed that there was nevertheless no significant difference in the mean ratings of the two groups, with a z-calculated value of 0.25 which was less than the z-critical value of ±1.96. The finding indicates that lecturers value the platform for allowing students to contribute to course discussion at their own convenience and from whatever device they possess, and for the view it gives the lecturer of participation patterns across a class. It agrees with Ibe and Okereke (2023), who established that real-time feedback in online learning raises student engagement and improves learning outcomes, since a platform on which questions receive prompt response supplies exactly that feedback. Nwogbo and Eze (2023) reported that platforms of this kind build a sense of community in online learning, which explains the high rating recorded for the clarification of thinking through exposure to alternative viewpoints, while Hall and Griffin (2019) demonstrated that engagement rises where participation is possible outside the scheduled class. How confidently a platform is used depends on the preparation behind it, and Wosu et al. (2024) established that continuous professional development programmes shaped the teaching methodologies teachers adopted, which suggests that training determines whether an interactive tool is used for genuine exchange or merely for posting notices.

Findings on research question 2 on Table 2 revealed that lecturers' utilization of the interactive whiteboard enhances effective instructional delivery to a high extent, with aggregate mean scores of 2.74 and 2.73, the closest agreement between the two universities on any tool in this study. Hypothesis 2 on Table 5 showed that there was no significant difference in the mean ratings of the two groups, with a z-calculated value of 0.04 which was less than the z-critical value of ±1.96. The finding indicates that lecturers regard the whiteboard as enabling students to work together, as supporting a student-centred environment that improves motivation, and as allowing multimedia content to be displayed and worked upon during the lesson. This aligns with Adetunji et al. (2022), who found that the enhancement of classroom interaction through display technologies improves the quality of instruction, and with Basko and Hartman (2017), who established that student engagement rises where lesson content can be manipulated in front of the class rather than merely shown. Dunn and Rakes (2022) reported that digital tools of this kind serve instruction best where teachers are confident in operating them, which suggests that the high rather than very high ratings recorded here reflect the level of familiarity as much as the value of the tool.

Findings on research question 3 on Table 3 revealed that lecturers' utilization of interactive video conferencing enhances effective instructional delivery to a high extent, with aggregate mean scores of 2.76 and 2.77, and this was the only tool on which lecturers in Ignatius Ajuru University of Education rated utilization above their counterparts. Hypothesis 3 on Table 6 showed that there was no significant difference in the mean ratings of the two groups, with a z-calculated value of -0.04 whose absolute value was less than the z-critical value of ±1.96. The finding indicates that lecturers regard the tool as enabling visual and audible interaction across distance, as removing the barrier that physical location imposes on attendance, and as supporting active participation in discussion of complex topics. It agrees with Chukwu

and Nkiruka (2021), who reported that arrangements of this kind promote lifelong learning by extending access to those who cannot attend in person, and with Jack and Ngkurum (2020), who examined the management of online teaching methods in Nigerian universities and found video conferencing central to continuity of instruction. Johnson et al. (2021) demonstrated that the modernisation of instructional practice through such tools improves the immediacy of teaching, while Ikechukwu (2024) established that the application of technological devices and software improves the performance of teaching staff. Because these exchanges take place on open platforms, the protection of academic information forms part of their management, and Longjohn and Longjohn (2026) drew attention to the security exposures that accompany academic processes in the era of artificial intelligence and social media.

Conclusion

Based on the findings of this study, it was concluded that educational management lecturers' utilization of piazza, the interactive whiteboard and interactive video conferencing enhances effective instructional delivery in Rivers State owned universities to a high extent, and that lecturers in the two universities do not differ significantly in their ratings of any of the three tools. The three aggregates fell within a narrow band, which suggests that lecturers draw on whichever interactive tool suits the teaching task rather than committing to one, and the ratings of high rather than very high extent across all three indicate that the capacity of these tools to sustain exchange between lecturer and student is recognised but not yet fully exploited in the two departments studied.

Recommendations

1. Departments should adopt a discussion platform such as piazza for every course, so that questions raised outside the lecture period receive timely response and so that participation is visible to the lecturer.
2. University management should install and maintain interactive whiteboards in lecture halls and ensure that lecturers are trained in their operation, since the benefit of the tool depends on the confidence with which it is used during a lesson.
3. The two universities should provide the equipment and connectivity required for interactive video conferencing, so that students who cannot attend in person are not excluded from instruction.
4. Lecturers should be encouraged to design lessons around interaction rather than presentation when using these tools, so that the exchange the tools make possible actually takes place.
5. University management should establish a record of the use of these tools across departments at the end of each session, so that the extent of utilization can be assessed and support directed where it is most needed.

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