Assessing the Factors Affecting the Adoption of Technological Tools Among Academic Staff for Quality Delivery in Tertiary Institutions in Rivers State

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Abstract
The study assessed the factors affecting the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. Three research questions with corresponding hypotheses guided the study. This study adopted the descriptive survey design. The population of the study consisted of 3,154 academic staff from the three Universities in Rivers State. Taro Yamane formular was used to determine a sample size 355 respondents. Multistage sampling technique, stratified random sampling and stage Quota sampling technique were applied. The developed instrument titled: "Assessing the Factors Affecting the Adoption of Technological Tools among Academic Staff for Quality Delivery Questionnaire (AFAATTASSQDQ) was used. The constructed instrument was determined by the experts in Test and Measurement in the Department of Educational Foundations, Rivers State University. Cronbach Alpha method established a reliability index of 0.79 and out of 355 copies of the instrument administered, 330 copies of the questionnaire were retrieved. Mean and standard deviation answered research questions while Anova associated with Posthoc tested hypotheses at a 0.05 level of significance. The study revealed that lack of technological literacy and competence, inadequate institutional support and infrastructure and high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State. The study recommended among others that academic staff in tertiary institutions in Rivers State should be provided with comprehensive training programmes to enhance their technological literacy and competence through regular workshops and continuous professional development initiatives should be implemented to ensure staff can effectively utilize technological tools for quality delivery.

Keywords: *Assessing the Factors, Adoption of Technological Tools, Academic Staff for Quality Delivery.*

Introduction

Assessing the factors affecting the adoption of technological tools among academic staff for quality delivery in tertiary institutions is a growing concern in the educational landscape. With rapid advancements in technology, educational institutions worldwide are increasingly integrating digital tools to enhance teaching, learning, and administration. However, the adoption of these technological tools among academic staff in tertiary institutions is influenced by various factors that need to be explored for better understanding and implementation. The first factor affecting adoption is the individual academic's attitude and willingness to embrace

new technology. As highlighted by Adetoro et al. (2023), academic staff members' perceptions of the utility and ease of use of technology are crucial in determining whether they adopt these tools in their teaching practices. Those who perceive technological tools as beneficial to their teaching outcomes are more likely to incorporate them into their routines. Conversely, academic staff who viewed technology as complicated or unnecessary may resist its integration, thereby hindering its widespread use.

Institutional support also plays a critical role in the adoption process. Adequate infrastructure, access to high-speed internet, and well-maintained hardware are essential for the effective use of technological tools. Uzochukwu and Obi (2024) emphasized the importance of institutional policies that prioritize the integration of technology in the curriculum. When universities provide the necessary resources and support systems, academic staff are more likely to use technology in their classrooms, fostering an environment conducive to innovation. Without such support, technological adoption may remain superficial, limiting its potential for improving educational outcomes. Training and professional development opportunities are also fundamental in promoting the use of technology by academic staff. As noted by Ojedokun and Akinlolu (2023), regular training sessions and workshops on technological tools can increase the confidence of academic staff in using these resources effectively. Continuous professional development helps bridge the knowledge gap between staff members who may not be technologically savvy and those who are well-versed in using digital tools. Providing training opportunities fosters a culture of learning and adaptability among academic staff, enhancing their ability to integrate technology into their teaching methods.

The challenges faced by academic staff in adopting technological tools are multifaceted. One of the major obstacles is resistance to change, particularly among older or less tech-savvy staff. As discovered by Bamidele and Olayinka (2023), many academics express concerns about the complexity of new technological tools and their impact on traditional teaching methods. Additionally, there are logistical challenges such as insufficient infrastructure, inadequate internet connectivity, and lack of technical support, which often discourage staff from embracing these technologies. These barriers can lead to frustration and disengagement, ultimately affecting the quality of teaching and learning. Despite the challenges, the adoption of technological tools offers significant benefits to the educational society. Technological integration can enhance the quality of education by providing access to diverse learning resources, promoting interactive learning, and facilitating collaboration among students and faculty. Furthermore, it enables academic staff to reach a broader audience through online platforms, contributing to lifelong learning opportunities. As observed by Eze and Njoku (2024), the effective use of digital tools can lead to improved educational outcomes, more engaging lectures, and greater efficiency in administrative tasks. In the long run, the successful adoption of these technologies can position tertiary institutions as leaders in academic excellence and innovation, thus benefiting both staff and students alike.

The lack of technological literacy and competence among academic staff in Rivers State's tertiary institutions significantly impacts the adoption of technological tools for quality delivery. Many lecturers struggle with the required skills to effectively integrate modern technological tools in their teaching, leading to underutilization of available digital resources. This technological gap affects both teaching effectiveness and students' learning experiences,

as academic staff are often hesitant to use technologies that could enhance educational outcomes. This challenge is compounded by a general lack of training in new technologies, which further reduces the ability of staff to meet the evolving demands of education in a digital age. In a study conducted by Wordu et al. (2021), it was found that digital literacy directly influences teachers' job performance, with low levels of digital communication, safety, and creativity affecting academic productivity and student engagement. The results indicated that academic staff's digital literacy is crucial for their job performance, highlighting the direct link between technology adoption and educational quality.

Inadequate institutional support and infrastructure are also critical barriers to the adoption of technological tools in tertiary institutions in Rivers State. The lack of sufficient technological infrastructure, such as reliable internet access, modern computers, and functional learning management systems, severely limits the potential for using technology in academic settings. Furthermore, without proper institutional backing, including financial support for purchasing necessary tools and training staff, there is little incentive for academic staff to engage with technology. Research has shown that the adoption of technology in Nigerian tertiary institutions is often hampered by poor infrastructure and lack of support systems. As noted by Umrani-Khan and Iyer (2019), the presence of adequate infrastructure is a fundamental facilitating condition for the effective use of e-learning systems in educational institutions. Without such support, the adoption of technology remains sluggish, impacting the quality of education delivered. Kosgei (2015) emphasized that the availability of ICT infrastructure is crucial in influencing the adoption of e-learning, underlining the need for institutional investment in these areas to foster technology-driven academic growth.

The high cost of technology is another significant factor hindering the adoption of technological tools in tertiary institutions in Rivers State. The financial burden of acquiring and maintaining technology, such as computers, software, and high-speed internet, places a strain on both the institutions and individual academic staff. In many cases, staff are unable to afford personal devices or necessary upgrades, leading to unequal access to technological resources. As noted by Alahmari and Kyei-Blankson (2016), the high cost of technology is one of the primary challenges that limits the widespread adoption of e-learning platforms in educational settings. This issue is particularly evident in regions where budget constraints limit the ability of institutions to provide adequate resources for faculty and students alike. Furthermore, a study by Nanchang (2019) suggested that performance expectancy, which includes the perceived financial benefits of using e-learning, is a critical factor influencing whether or not technology is adopted. When the cost outweighs perceived benefits, adoption becomes unlikely, negatively impacting the quality of teaching and learning.

With the support of Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003), extends TAM by introducing additional factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. These factors offer a comprehensive framework for understanding the complexities of technology adoption in academic environments. Performance expectancy relates to how academic staff perceive that using a technology will enhance their job performance, while effort expectancy concerns the perceived ease of using the technology. Social influence reflects the degree to which academic staff feel pressure from peers or supervisors to adopt the technology. Facilitating conditions

include the availability of resources and training to effectively use the technology. Recent studies have shown that UTAUT's broader scope provides a more nuanced understanding of technology adoption in tertiary institutions, as it considers not only individual attitudes but also the institutional support systems that contribute to successful adoption. Both TAM and UTAUT underscore the importance of context, user characteristics, and institutional environment in fostering the adoption of technology for educational quality improvement.

The study contributed to the existing knowledge by highlighting the various factors that influence the integration of technology in academic environments, specifically within tertiary institutions in Rivers State. It explored the challenges and opportunities faced by academic staff in adopting technological tools for teaching and learning, offering insights into institutional support, training, and resource availability. The research aimed to assess the factors affecting the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.

Statement of the Problem

The motivation behind this research stems from the challenges faced by academic staff in tertiary institutions in Rivers State regarding the adoption and effective use of technological tools for quality teaching delivery. While technological advancements have the potential to significantly enhance the educational experience, many academic staff members are still reluctant or unable to integrate these tools into their daily teaching practices. This reluctance can be attributed to factors such as inadequate training, lack of access to necessary technological resources, and limited institutional support. The inability to leverage technology not only hinders teaching quality but also prevents students from acquiring the skills needed in today's digital world.

Core factors influencing the low adoption of technological tools include insufficient digital literacy, inadequate infrastructural support like poor internet connectivity, and a general resistance to change among academic staff. Additionally, many staff members lack motivation to use technology due to the absence of clear incentives or the perception that traditional teaching methods are sufficient. To address these problems, institutions must prioritize offering regular and comprehensive training sessions to enhance digital literacy. Improving the technological infrastructure and providing continuous technical support are essential steps, as is creating a culture that encourages innovation and offers incentives for staff who adopt and effectively use technology in their teaching methods. These measures would not only boost the quality of teaching but also equip students with the necessary skills for success in a technology-driven world.

Aim and Objectives of the Study

Assessing the Factors Affecting the Adoption of Technological Tools among Academic Staff for quality delivery in Tertiary Institutions in Rivers State

1. Determine the extent lack of technological literacy and competence affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.
2. Ascertain the extent inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.

3. Find out the extent high cost of technology affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State

Research Questions

1. To what extent does lack of technological literacy and competence affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?
2. To what extent does inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?
3. To what extent does high cost of technology affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?

Hypotheses

1. Lack of technological literacy and competence does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.
2. Inadequate institutional support and infrastructure does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.
3. High cost of technology does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State.

Methodology

This study adopted the descriptive survey design. Descriptive survey design is a research method that aims to collect detailed and accurate information about a phenomenon by observing and describing its characteristics, without influencing or manipulating the subjects involved. Akindele and Bolarinwa (2019) highlighted that descriptive survey designs are flexible and can be applied in various fields, as they allow researchers to describe and analyze the characteristics of a population or phenomenon in a structured, systematic manner. The population of the study consisted of 3,154 academic staff from the three Universities in Rivers State at the time of the study (University of Port Harcourt = 1,530, Rivers State University = 1,094 and Ignatius Ajuru University of Education = 530 Academic Staff). Sources: Academic Planning Unit of University of Port Harcourt, the Establishment Unit Rivers State University and establishment unit of Ignatius Ajuru University of Education as at June, 2024.

The sample size for this study was 355 respondents. The sample was determined using Taro Yamane formular from the total population for the study. Multistage sampling technique was adopted for this study. First a stratified random sampling was used to stratify academic staff into Uniport, RSU and IAUE in order to select 355 academic staff. Second stage Quota sampling technique was applied to select 186 academic staff from Uniport, 109 academic staff from RSU and 60 academic staff from IAUE. The developed instrument titled: “Assessing the Factors Affecting the Adoption of Technological Tools among Academic Staff for Quality Delivery Questionnaire (AFAATTASSQDQ) was used. The AFAATTASSQDQ questionnaire was divided into two sections (A and B); Section A contained the demographic data of the respondents while section B contained 15 items questionnaire instruments for the study. The

segment of the instrument was patterned on four scale modified four Likert type rating scale of Very High Extent (VHE) 4-points, High Extent (HE) 3-points, Low Extent (LE) 2-points and Very Low Extent (VLE) 1-point.

The constructed instrument was determined by the experts in Test and Measurement in the Department of Educational Foundations, Rivers State University. The reliability of the coefficient was established by administering 30 copies of the instrument to academic staff who not part of the study were selected randomly from Federal College of Education Technical Omoku. Cronbach Alpha method established the yielded reliability index of 0.79 which showed that the instrument was reliable and out of 355 copies of the instrument administered to the selected academic staff of Uniport, RSU and IAUE, 330 copies of the questionnaire were retrieved on the spot and used after collation for data analysis. Mean and standard deviation was used to answer the research questions while Anova was used to test hypotheses at a 0.05 level of significance.

Results and Discussion

Research Question One: To what extent does lack of technological literacy and competence affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?

Table 4.1: ***Mean and standard analysis on the extent lack of technological literacy and competence affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

S/N	Item Statements	Uniport N =176		RSU N=99		IAUE N=55		Mean Sets	Remarks
		$\bar{x}_1$	S.D	$\bar{x}_2$	S.D	$\bar{x}_3$	S.D	$\frac{\bar{x}_1+\bar{x}_2+\bar{x}_3}{3}$	
1	I find it challenging to use advanced teaching tools because I lack proper training in their operation.	3.09	.64	3.07	.55	3.02	.44	3.06	High Extent
2	I often feel hesitant to adopt new technologies because I am not confident in my digital skills.	3.09	.69	3.08	.55	3.09	.50	3.09	High Extent
3	I struggle to integrate technology into my lessons because I am not familiar with most of the tools available.	3.06	.74	3.05	.54	2.96	.55	3.02	High Extent
4	I worry about making errors when using technological tools, which discourages me from relying on them for teaching.	3.16	.79	3.06	.57	3.04	.62	3.09	High Extent
5	I realize that my limited knowledge of technology								

	prevents me from exploring creative ways to improve my teaching methods.	3.21	.68	3.06	.57	2.98	.57	3.08	High Extent
	Average Mean/Std Dev.	**3.12**	**.57**	**3.06**	**.57**	**3.02**	**.54**	**3.07**	**High Extent**

The results from Table 4.1 reveal that the lack of technological literacy and competence has a significant effect on the adoption of technological tools by academic staff for quality delivery in tertiary institutions in Rivers State. The average mean score of 3.07 across the three institutions - University of Port Harcourt (mean = 3.12), Rivers State University (mean = 3.06), and Ignatius Ajuru University of Education (mean = 3.02) indicates a "High Extent" of challenges. The standard deviation values (ranging from 0.54 to 0.57) show consistent responses. Key issues include inadequate training in advanced tools (mean = 3.06), lack of confidence in digital skills (mean = 3.09), unfamiliarity with available tools (mean = 3.02), fear of errors (mean = 3.09), and restricted creativity in teaching due to limited technological knowledge (mean = 3.08). The researcher is of opinion that without addressing these issues, the quality of education and delivery in these institutions may suffer and it is essential to provide tailored professional development programs, hands-on technological training, and ongoing support to enhance the digital skills and confidence of academic staff which would enable them to effectively integrate and maximize the use of technological tools for better teaching outcomes.

Research Question Two: To what extent does inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?

Table 4.2: ***Mean and standard analysis on the extent inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

S/N	Item Statements	Uniport N =176		RSU N=99		IAUE N=55		Mean Sets	Remarks
		$\bar{x}_1$	S.D	$\bar{x}_2$	S.D	$\bar{x}_3$	S.D	$\frac{\bar{x}_1+\bar{x}_2+\bar{x}_3}{3}$	
1	I experience frequent disruptions in using online platforms due to unreliable internet connectivity provided by my institution.	2.94	.57	3.09	.50	3.04	.55	3.02	High Extent
2	I find it difficult to deliver quality teaching because there are insufficient technological tools like projectors and smart boards in my institution.	3.09	.50	3.02	.44	2.96	.55	3.02	High Extent
3	I sometimes face challenges in resolving technical issues because my institution does	3.06	.62	3.04	.51	3.04	.55	3.05	

	not offer regular technical support.							High Extent
4	I lack motivation to adopt new technologies because my institution does not organize workshops or training sessions to enhance my skills.	3.04	.66	3.06	.53	3.17	.64	3.09	High Extent
5	I feel that my institution's lack of emphasis on technology adoption limits my ability to explore innovative teaching methods.	3.05	.51	3.06	.53	3.06	.48	3.06	High Extent
	Average Mean/Std Dev.	**3.04**	**.57**	**3.05**	**.50**	**3.05**	**.55**	**3.05**	**High Extent**

The analysis in Table 4.2 revealed that inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff in tertiary institutions in Rivers State. The overall mean score across the three institutions (Uniport: 3.04, RSU: 3.05, IAUE: 3.05) indicates a high extent of effect, with the highest mean score observed for the statement on the lack of workshops and training sessions (3.09). The consistently high mean values, coupled with relatively low standard deviations, underscore the uniformity of the academic staff's experiences regarding unreliable internet, insufficient technological tools, inadequate technical support, and a lack of institutional emphasis on technology adoption. The researcher agreed that systemic deficiencies hinder innovative teaching methods and quality delivery and to address these issues, institutions could invest in reliable internet, provide up-to-date technological tools, establish robust technical support systems, and organize regular workshops to enhance staff competency by integrating institutional support into strategic plans to foster sustainable technological adoption and improve teaching outcomes.

Research Question three: To what extent does high cost of technology affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State?

Table 4.3: ***Mean and standard analysis on the extent high cost of technology affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

S/N	Item Statements	Uniport N =176		RSU N=99		IAUE N=55		Mean Sets	Remarks
		$\bar{x}_1$	S.D	$\bar{x}_2$	S.D	$\bar{x}_3$	S.D	$\frac{\bar{x}_1+\bar{x}_2+\bar{x}_3}{3}$	
11	I cannot afford to purchase personal laptops or tablets, which limits my ability to integrate technology into my teaching.	3.20	.71	3.28	.69	3.21	.54	3.23	High Extent
12	I find the subscription costs for educational software and								

	online platforms too expensive to sustain.	3.35	.48	3.25	.53	3.22	.64	3.27	High Extent
13	I notice that my institution struggles to allocate funds for updating or maintaining technological tools, making them less accessible.	3.29	.55	3.20	.56	3.20	.49	3.23	High Extent
14	I am unable to enroll in advanced training programs or obtain certifications because of their high costs.	3.32	.56	3.11	.59	3.16	.51	3.20	High Extent
15	I often rely on outdated technology because the cost of upgrading to newer tools is beyond my financial capacity.	3.31	.47	3.31	.66	3.09	.53	3.24	High Extent
	Average Mean/Std Dev.	**3.29**	**.55**	**3.25**	**.61**	**3.18**	**.54**	**3.23**	**High Extent**

The results from Table 4.3 revealed that the high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State, with an overall mean of 3.23 (indicating a high extent) and an average standard deviation of .55, .61, and .54 for Uniport, RSU, and IAUE respectively. The findings show consistent challenges across institutions, such as the inability to afford personal laptops or tablets (mean = 3.23), expensive subscription costs for educational software (mean = 3.27), limited institutional funding for technological updates (mean = 3.23), high costs of training programs (mean = 3.20), and reliance on outdated technology due to unaffordability of upgrades (mean = 3.24). These results imply that financial barriers hinder academic staff from integrating modern technology effectively into their teaching, potentially affecting the quality of education delivery. Addressing this issue requires targeted interventions, such as institutional subsidies for technological tools, partnerships with software providers for cost reduction, and funding for advanced training. Additionally, the researcher emphasized the need for policy reforms to prioritize technological investments in education budgets, ensuring academic staff have equitable access to essential resources.

Hypotheses

Ho$_1$: Lack of technological literacy and competence does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State

Table 4.4: ***Anova analysis on the extent lack of technological literacy and competence significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.687	2	.344	1.384	.252

Within Groups	81.203	327	.248
Total	81.891	329	

* Significance 0.05 > 0.00. Not Significance 0.05 < 0.00

The ANOVA analysis in Table 4.4 evaluated the extent to which a lack of technological literacy and competence significantly affects the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. With a p-value (Sig.) of 0.252, which is greater than the 0.05 significance threshold, the result indicates no statistically significant effect of technological literacy and competence deficiencies on the adoption of technological tools. This suggested that other factors may be influencing the adoption process. The negative implication of this finding is that interventions focused solely on improving technological literacy and competence may not yield substantial improvements in the adoption of technological tools, potentially hindering overall quality delivery. To address this, institutions could consider a more comprehensive approach, including addressing infrastructural challenges, motivational factors, and organizational support to foster a conducive environment for adopting technological innovations effectively.

Table 4.5: ***Post Hoc Tests on the extent lack of technological literacy and competence significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

(I) Moderating Variables	(J) Moderating Variables	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
UNIPORT	RSU	.04735	.06260	.450	-.0758	.1705
	IAUE	-.09205	.07698	.233	-.2435	.0594
RSU	UNIPORT	-.04735	.06260	.450	-.1705	.0758
	IAUE	-.13939	.08381	.097	-.3043	.0255
IAUE	UNIPORT	.09205	.07698	.233	-.0594	.2435
	RSU	.13939	.08381	.097	-.0255	.3043

The Post Hoc test results in Table 4.5 assessed the extent to which lack of technological literacy and competence significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State. The comparison of mean differences between institutions (UNIPORT, RSU, IAUE) shows that none of the differences are statistically significant ($p > 0.05$). For instance, the mean difference between UNIPORT and RSU is 0.04735 ($p = 0.450$), and between UNIPORT and IAUE, it is -0.09205 ($p = 0.233$), both failing to demonstrate significance within the 95% confidence interval. The results suggest that the institutions face comparable challenges related to technological literacy and competence without significant disparities. The negative implication is that the lack of proficiency in technological tools is a systemic issue, potentially hindering effective quality delivery across all institutions in the region. To address this, institutions could prioritize tailored professional development programs focused on technological literacy, increase access to digital tools, and establish a supportive environment that promotes the adoption of technology in pedagogy. This collective approach could mitigate the uniform challenges observed and enhance overall academic delivery.

Ho$_2$: Inadequate institutional support and infrastructure does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State

Table 4.6: ***Anova analysis on the extent inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.056	2	.028	.154	.857
Within Groups	58.917	327	.180		
Total	58.973	329			

* Significance 0.05 > 0.00. Not Significance 0.05 < 0.00

The ANOVA analysis presented in Table 4.6 examined the extent inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. The result shows no statistically significant effect, as indicated by the F-value of 0.154 and a significance (p-value) of 0.857, which is greater than the threshold of 0.05. This implies that variations in institutional support and infrastructure do not meaningfully influence the use of technological tools among the academic staff in this context. The negative implications of this finding include potential stagnation in technological adoption due to other unidentified barriers that need addressing, such as individual readiness, training, or policy enforcement. Based on this result, it is suggested that tertiary institutions could focused on comprehensive strategies that go beyond infrastructure, such as targeted capacity-building initiatives, fostering a supportive culture for technology use, and periodic evaluations to identify hidden challenges impeding adoption.

Table 4.7: ***Post Hoc Tests on the extent inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

(I) Moderating Variables	(J) Moderating Variables	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
UNIPORT	RSU	-.01010	.05333	.850	-.1150	.0948
	IAUE	-.03636	.06557	.580	-.1654	.0926
RSU	UNIPORT	.01010	.05333	.850	-.0948	.1150
	IAUE	-.02626	.07139	.713	-.1667	.1142
IAUE	UNIPORT	.03636	.06557	.580	-.0926	.1654
	RSU	.02626	.07139	.713	-.1142	.1667

The post hoc tests in Table 4.7 showed that there were no significant differences between the institutions - UNIPORT, RSU, and IAUE - regarding the extent to which inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. The mean differences across all comparisons (UNIPORT vs RSU, UNIPORT vs IAUE, and RSU vs IAUE) are

minimal, with p-values well above the standard significance threshold of 0.05 (ranging from 0.580 to 0.850). This indicates that the perceived impact of inadequate institutional support and infrastructure on technology adoption does not significantly vary between these institutions. The negative implications suggest that across the institutions, academic staff may face similar barriers in adopting technological tools, likely hindering the potential for enhancing quality delivery. In my view, addressing these infrastructure gaps and providing more robust institutional support could promote greater adoption of technology, improving overall educational quality in these institutions.

Ho$_3$: High cost of technology does not significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State

Table 4.8: ***Anova analysis on the extent high cost of technology significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.874	2	.437	1.481	.229
Within Groups	96.523	327	.295		
Total	97.397	329			

* Significance 0.05 > 0.00. Not Significance 0.05 < 0.00

The ANOVA analysis presented in Table 4.8 showed that the extent to which the high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State is not statistically significant, as indicated by the F-value of 1.481 and a p-value (Sig.) of 0.229, which is greater than the 0.05 threshold for significance. This result implies that high costs, while potentially a concern, do not significantly hinder academic staff from adopting technological tools for quality delivery. However, the lack of significance might mask underlying challenges, such as the willingness of staff to bear personal costs or institutional subsidies mitigating the issue. The negative implications include potential disparities in access to technology and a risk of overlooking cost as a barrier for some staff. To address this, institutions could proactively monitor cost-related issues and provide targeted support, such as grants or subsidies, ensuring equitable access to technological tools for all academic staff, thereby enhancing overall teaching quality.

Table 4.9: ***Post Hoc Tests on the extent high cost of technology significantly affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State***

(I) Moderating Variables	(J) Moderating Variables	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
UNIPORT	RSU	.02652	.06825	.698	-.1078	.1608
	IAUE	-.12500	.08393	.137	-.2901	.0401
RSU	UNIPORT	-.02652	.06825	.698	-.1608	.1078
	IAUE	-.15152	.09137	.098	-.3313	.0282
IAUE	UNIPORT	.12500	.08393	.137	-.0401	.2901

RSU	.15152	.09137	.098	-.0282	.3313

The Post Hoc tests in Table 4.9 indicated that there were no statistically significant differences in the mean differences between the institutions regarding the impact of high technology costs on the adoption of technological tools among academic staff in Rivers State. For instance, the comparison between UNIPORT and RSU yielded a mean difference of 0.02652 with a significance value of 0.698, indicating no significant effect. Similarly, the comparisons involving IAUE and the other institutions also showed non-significant results (p-values > 0.05). The results suggested that while the costs of technology may affect adoption, the differences in perceptions across the institutions studied are not significant. The lack of significant findings could imply that all the institutions may face similar challenges in adopting technological tools due to cost constraints, regardless of institutional differences. This raises concerns about the accessibility of advanced technologies in tertiary institutions, which could hinder the quality of education and research. It is crucial for policy-makers and university management to consider strategies that could mitigate the cost burden, such as government subsidies or partnerships with tech companies, to enhance the effective use of technology for academic purposes.

Discussion of Findings

The results from Table 4.1 revealed that the lack of technological literacy and competence has a significant effect on the adoption of technological tools by academic staff for quality delivery in tertiary institutions in Rivers State. The researcher is of opinion that without addressing these issues, the quality of education and delivery in these institutions may suffer and it is essential to provide tailored professional development programs, hands-on technological training, and ongoing support to enhance the digital skills and confidence of academic staff which would enable them to effectively integrate and maximize the use of technological tools for better teaching outcomes. The ANOVA analysis in Table 4.4 evaluated the extent to which a lack of technological literacy and competence significantly affects the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. The Post Hoc test results in Table 4.5 assessed the extent to which lack of technological literacy and competence significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State. Research by Melo Fiallos et al. (2021) similarly with the present study finding indicated that the lack of technological literacy among academic staff significantly affects the adoption of technological tools in tertiary institutions. This deficiency in digital competence limits the ability of staff to effectively integrate new technologies into their teaching practices, leading to lower adoption rates. Furthermore, study by Al-Murtadha (2019) in line with the present study finding highlighted that teachers who lack digital competence are often overwhelmed by the complexities of technological tools, hindering their willingness to adopt these technologies in their educational practices.

The analysis in Table 4.2 revealed that inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff in tertiary institutions in Rivers State. The researcher agreed that systemic deficiencies hinder innovative teaching methods and quality delivery and to address these issues, institutions could invest in reliable internet, provide up-to-date technological tools, establish robust technical support systems, and organize regular workshops to enhance staff competency by integrating

institutional support into strategic plans to foster sustainable technological adoption and improve teaching outcomes. The ANOVA analysis presented in Table 4.6 examined the extent inadequate institutional support and infrastructure significantly affects the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. The post hoc tests in Table 4.7 showed that there were no significant differences between the institutions - UNIPORT, RSU, and IAUE - regarding the extent to which inadequate institutional support and infrastructure affect the adoption of technological tools among academic staff for quality delivery in tertiary institutions in Rivers State. A study by Ayu (2020) in line with the present stud finding found that institutions with limited technical infrastructure, such as outdated hardware and unreliable internet connections, face significant challenges in encouraging staff to use technological tools. The research further revealed that academic staff are more inclined to adopt technology when they have access to reliable resources and institutional backing and inadequate training programs and the lack of a strategic vision for digital integration exacerbate this issue. Similarly, Melo Fiallos et al. (2021) study in relation with the present study finding observed that universities in developing countries struggle with poor infrastructure, which in turn stifles innovation and technology adoption and without strong institutional support, faculty members often feel unsupported, leading to reluctance in integrating new tools into their teaching practices.

The results from Table 4.3 revealed that the high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State. These results imply that financial barriers hinder academic staff from integrating modern technology effectively into their teaching, potentially affecting the quality of education delivery. Addressing this issue requires targeted interventions, such as institutional subsidies for technological tools, partnerships with software providers for cost reduction, and funding for advanced training. Additionally, the researcher emphasized the need for policy reforms to prioritize technological investments in education budgets, ensuring academic staff have equitable access to essential resources. The ANOVA analysis presented in Table 4.8 showed that the extent to which the high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State. The Post Hoc tests in Table 4.9 indicated that there were no statistically significant differences in the mean differences between the institutions regarding the impact of high technology costs on the adoption of technological tools among academic staff in Rivers State. Research by Al-Murtadha (2019) in line with the present study finding revealed that high cost of technology remains a significant barrier to the adoption of digital tools among academic staff in tertiary institutions and financial constraints of educational institutions, particularly in lower-income regions, make it difficult for universities to invest in up-to-date technology. Academic staff are less likely to adopt new technologies if the institution cannot provide affordable or subsidized access. Moreover, Ayu (2020) finding in corroboration with the present study finding discussed how the high cost of acquiring software and hardware can deter faculty members from fully engaging with technological tools, as they may not see the return on investment without institutional support. As technology becomes increasingly vital in the academic landscape, these cost-related challenges hinder the widespread adoption of digital tools essential for quality teaching and learning.

Conclusion

Based on the finding, the study concluded that lack of technological literacy and competence has a significant effect on the adoption of technological tools by academic staff for quality delivery in tertiary institutions, inadequate institutional support and infrastructure significantly affect the adoption of technological tools among academic staff in tertiary institutions and high cost of technology significantly affects the adoption of technological tools among academic staff in tertiary institutions in Rivers State.

Recommendations

1. Academic staff in tertiary institutions in Rivers State should be provided with comprehensive training programmes to enhance their technological literacy and competence through regular workshops and continuous professional development initiatives should be implemented to ensure staff can effectively utilize technological tools for quality delivery.

2. Tertiary institutions in Rivers State should be proactive in providing adequate institutional support and infrastructure to foster the adoption of technological tools which includes improving internet connectivity, providing sufficient access to modern technological devices, and establishing a robust technical support system to assist academic staff in integrating technology into their teaching methods.

3. The government and educational institutions should explore cost-effective solutions for acquiring technological tools, such as negotiating bulk purchase agreements or seeking partnerships with technology providers by subsidizing the cost of essential technology to make it more accessible for academic staff, ensuring that high costs do not hinder the adoption of technological tools.

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