ASSESSMENT OF POSTGRADUATE STUDENTS' USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN PUBLIC UNIVERSITIES IN SOUTH-EAST NIGERIA: A STUDY OF ZOOM CLOUD APPLICATION AND E-LIBRARY

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Abstract

Postgraduate students in state and federal universities in Nigeria are expected to make frequent use of Information and Communication Technology (ICT) to support their coursework, assignments, learning, and other academic activities. This study investigated the extent of ICT utilization among postgraduate students in public universities in the South-East zone of Nigeria. It addressed two research questions and tested two hypotheses. The study employed a descriptive survey design. The population comprised 17,651 postgraduate students drawn from ten public universities (five state-owned and five federal) accredited by the National Universities Commission (NUC) to offer postgraduate programmes in the South-East for the 2023/2024 academic session, excluding the Federal University of Technology, Owerri (FUTO), which does not run education programmes. A sample of 2,896 postgraduate students was determined using Taro Yamane's sampling formula. Data were collected with the instrument titled Extent of Postgraduate Students' Utilization of Information and Communication Technology for Academic Purposes Questionnaire (EPGSUICTFAPQ). The instrument was validated by three experts and its reliability established through Cronbach's Alpha, yielding coefficients of 0.890, 0.940, and 0.849 across the five clusters. Research questions were answered using mean and standard deviation, while the null hypotheses were tested using an independent samples t-test at a 0.05 level of significance with the aid of SPSS version 26. Findings revealed that postgraduate students in both state and federal universities make considerable use of computers and other ICT tools for academic purposes. Additionally, a significant relationship was observed between salary and teachers' job performance. Based on the results, the study recommended that public universities in Nigeria (both state and federal) should provide adequate and functional ICT facilities, such as computer systems and CCTV devices, to enhance postgraduate students' academic engagement.

Keywords: Assessment, Postgraduate Students, Use, Information, Communication Technology, Zoom Cloud, E-Library

1.1 Introduction

Education is a key driver of national development, serving as the bedrock for economic growth, social progress, and political stability. Oyedeji (2015) described education as the acquisition of knowledge, skills, habits, and cultural values necessary for adapting to a changing world. Similarly, Javis in Alemu (2018) viewed education as structured and continuous instruction aimed at imparting knowledge, skills, and understanding required for life's diverse activities. Education, therefore, plays a vital role in shaping an individual's development by instilling societal values and morals, while preparing them to contribute meaningfully to society. It influences people's attitudes, actions, and achievements, and enables them to appreciate and interact productively with their environment. Beyond this, education is a catalyst for change, positioning nations for global recognition and sustainable growth. A functional and well-developed educational system is thus essential for national advancement (Omoraka, Bello & Mohammed, 2014). In the modern era, such a system thrives best when information and communication technology (ICT) is integrated.

Information and communication technology (ICT) encompasses the use of a variety of tools such as computers, mobile devices, satellites, and the internet to collect, store, retrieve, and transmit information (Elujekwute, Habib & Ogundipe, 2021). It involves the creation, maintenance, and use of computer software, systems, and networks. ICTs broaden access to education, making learning flexible and accessible anytime and anywhere. They also stimulate national development and transform how people live and learn in the digital age. ICT has shifted Nigeria's education system from being teacher-centered to learner-centered, enhanced learning motivation and engagement, and improved the acquisition of essential skills. The Federal Republic of Nigeria (FRN, 2019) outlined ICT's educational objectives as enhancing teaching and learning, fostering critical thinking, problem-solving and innovation, promoting lifelong learning, supporting research and development, improving education management, and facilitating universal access to information. ICT also widens educational opportunities by enabling flexible, location-free learning, encourages commercialization of digital innovations, and supports infrastructure that drives creativity and knowledge-sharing.

In this study, ICT use among postgraduate students covers computers, Zoom cloud application, and e-library platforms. Computers have become central in university education for administration, examinations, and project work. Computer-based testing (CBT), introduced to replace traditional paper-and-pencil exams, has improved reliability, impartiality, and efficiency in assessments (Burns, 2018). According to Busayo in Duru and Okoye (2020), CBT offers numerous benefits, including improved test security, immediate feedback, efficient storage of scripts, reduced cheating, and flexibility in examination scheduling. Another vital ICT tool is Zoom cloud application, which is a video conferencing platform used for teaching, group discussions, and one-on-one consultations. It provides real-time interaction, easy recording, and resource sharing (Achibald and Barnald, 2018; Braun, Clarke & Gray, 2017). Similarly, electronic

libraries (e-libraries) have revolutionized academic libraries by offering digital access to information resources. Traditionally dominated by print, university libraries now provide e-resources such as e-books, journals, and databases, enabling postgraduate students to access vast information efficiently (Agbanu & Nwankwo, 2018; Okunlola, 2021). E-libraries provide several advantages, including timely access to updated information, simultaneous searches across multiple sources, and convenience in research (Akpojotor, 2016). At the postgraduate level, students, whether in diploma, master's, doctoral, or postdoctoral programmes, require deeper engagement with information resources for academic research and knowledge creation (Okunlola, 2021). Hence, universities in South-East Nigeria have integrated ICTs into postgraduate education to promote learning, research, and global competitiveness. Both students and staff are expected to acquire ICT competence for effective use in administration, teaching, and scholarship (Iloakasia, 2022).

However, despite the potential of ICT tools like Zoom and e-libraries, postgraduate students in Nigeria face challenges such as weak infrastructure, poor internet connectivity, unreliable electricity, high data costs, and limited digital skills (Madubuegwu, Ugwuozor, Onwe & Udenta, 2022). Although universities in the South-East have invested in ICT deployment, the extent of postgraduate students' actual utilization remains unclear. Most prior studies on ICT use in Nigeria focused on undergraduates, leaving a gap concerning postgraduate students who require advanced ICT tools for higher-level research. Assessing their use of ICT, particularly Zoom and e-libraries, is therefore necessary to determine adoption patterns, frequency of use, challenges faced, and overall impact on academic activities. Findings will provide valuable insights for policy formulation and ICT integration strategies in public universities in South-East Nigeria, ultimately strengthening postgraduate education in the region.

1.2 Statement of the Problem

Postgraduate education in Nigeria is expected to equip students with advanced knowledge, critical thinking skills, and research capacity needed for national development and global competitiveness. The integration of Information and Communication Technology (ICT) tools such as the Zoom Cloud application and e-library facilities provides a unique opportunity to improve access to academic resources, facilitate collaborative learning, and enhance research output. However, despite the increasing availability of ICT in Nigerian universities, concerns persist about the extent to which postgraduate students effectively utilize these tools for academic purposes. In public universities in South-East Nigeria, postgraduate students are often confronted with several barriers to ICT utilization. Unstable internet connectivity, inadequate ICT infrastructure, frequent power interruptions, and the high cost of data subscription hinder smooth access to online learning platforms such as Zoom and digital resources provided by e-libraries. Furthermore, some postgraduate students have limited digital literacy skills, making it difficult to navigate advanced ICT tools that are vital for research and virtual academic engagement.

Evidence from existing studies has mostly concentrated on ICT usage among undergraduates, with little emphasis on postgraduate students who require more intensive use of ICT for thesis writing, literature search, virtual conferences, and remote supervision. This gap in knowledge raises questions about whether postgraduate students in the South-East are maximizing the potential of the Zoom Cloud application for virtual learning and collaboration, and whether they are adequately using e-library resources to support their research and learning needs. If postgraduate students fail to optimally use ICT facilities such as Zoom and e-library, the quality of their research output, scholarly communication, and academic performance may be negatively affected. This situation poses a threat to the achievement of the objectives of postgraduate education in Nigeria, which is to produce competent researchers, innovators, and professionals. Therefore, there is a need to assess the extent of postgraduate students' utilization of ICT, specifically the Zoom Cloud application and e-library in public universities in South-East Nigeria, with a view to identifying gaps, challenges, and possible areas for improvement.

1.3 Research Questions

The following research questions guided the study:

1. To what extent do postgraduate students explore the use of zoom application in public universities in South East?
2. To what extent do postgraduate students utilize electronic library in public universities in South East?

1.4 Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of postgraduate students' of state and federal universities on the use of zoom application in public universities in South East.
2. There is no significant difference in the mean ratings of postgraduate students' of state and federal universities on the use of electronic library in public universities in South East.

2. Methods

The study employed a descriptive survey design. The population comprised 17,651 postgraduate students drawn from ten public universities (five state-owned and five federal) accredited by the National Universities Commission (NUC) to offer postgraduate programmes in the South-East for the 2023/2024 academic session, excluding the Federal University of Technology, Owerri (FUTO), which does not run education programmes. A sample of 2,896 postgraduate students was determined using Taro Yamane's sampling formula. Data were collected with the instrument titled Extent of Postgraduate Students' Utilization of Information and Communication Technology for Academic Purposes Questionnaire (EPGSUICTFAPQ). The instrument was validated by three experts and its reliability established through Cronbach's Alpha, yielding coefficients of 0.890, 0.940, and 0.849 across the five clusters. Research questions were

answered using mean and standard deviation, while the null hypotheses were tested using an independent samples t-test at a 0.05 level of significance with the aid of SPSS version 26.

3. Results

Research Question 1: To what extent do postgraduate students' explore the use of zoom application in public universities in South East?

Table 1: *Postgraduate Students' Utilization of Zoom Application in Public Universities in South East (N = 2,896)*

S/N	Zoom Application To what extent are:	Mean	SD	Decision
1	zoom used for proposal defence.	2.17	.82	Low extent
2	zoom used for Faculty defence.	2.32	.81	Low extent
3	zoom used for external defence.	3.22	.81	High extent
4	zoom used for seminar presentation.	3.48	.59	High extent
5	zoom used for class lecture.	2.98	.99	High extent
6	zoom used for workshop.	3.32	.77	High extent
7	zoom used during university events	3.16	1.13	High extent
8	zoom during PG orientation programme	3.04	.92	High extent
	Grand Mean	**2.96**	**0.86**	**High Extent**

As indicated in Table 1, postgraduate students reported that they make use of six out of the eight zoom application to a high extent for academic purposes in public universities within the South East region of Nigeria as revealed on items 3, 4, 5, 6, 7 and 8 with mean scores of 3.22, 3.48, 2.98, 3.32, 3.16, and 3.04, and standard deviations of 0.81, 0.59, 0.99, 0.77, 1.13, and 0.92 respectively. This is supported by a grand mean of 2.96 and a standard deviation of 0.86. The mean scores for the six zoom application ranged from 2.98 to 3.48, all above the benchmark mean of 2.50. In contrast, the use of zoom for proposal and faculty defences were reported to be infrequent, with a lower mean score of 2.17 and 2.32 as shown on items 1 and 2 respectively. The standard deviation values, which ranged from 0.59 to 1.13, suggest a strong level of consistency and agreement among the respondents in their views on the use of zoom application for academic purposes in public universities in the South East.

Hypothesis 1: There is no significant difference in the mean ratings of postgraduate students' of state and federal universities on the use of zoom application for academic purposes in public universities in South East.

Table 2: *Independent t-test Analysis of the Mean Rating of Respondents on the Significant Difference between State and Federal Universities on the Use of Zoom Application for Academic Purposes in Public Universities in South East (N = 2,896)*

Factor	University Type	N	Mean	SD	t	df	P-value	Decision
Zoom Application	State	1,579	33.12	4.32				
					2.23	2,894	.36	Not Sig
	Federal	1,317	41.70	5.92				

Table 2 presents a statistical difference between state and federal universities in their use of the Zoom application by postgraduate students for academic purposes in public universities within the South East region. The t-test analysis reveals a t-value of 2.23 and a P-value of 0.36. Since the P-value is greater than the 0.05 level of significance at degrees of freedom 2 and 2,894 (t(2,894) = 0.36, p > 0.05), this indicates that there is no statistically significant difference in the responses of postgraduate students from state and federal universities concerning the academic use of Zoom application. As a result, the null hypothesis is accepted.

Research Question 2: To what extent do postgraduate students' explore the use of electronic library in public universities in South East?

Table 3: *Postgraduate Students' Utilization of Electronic Library in Public Universities in South East (N = 2,896)*

S/N	Electronic Library To what extent are:	Mean	SD	Decision
9	there available facilities for electronic library in your institution.	3.07	.94	High extent
10	there automated academic books in your PG school library.	2.13	.49	Low extent
11	there electronically developed academic softwares for postgraduate students in your institution.	3.32	.93	High extent
12	reputable electronic journals made easily accessible in your PG school library	3.09	.85	High extent
13	there availability of unrestricted internet for postgraduate students in your institution library.	2.97	1.02	High extent
14	postgraduate students been integrated into a data base that can enable them access electronic materials in the library from their respective locations.	3.16	1.13	High extent
15	PG students effectively trained through workshop on how to use electronic library.	3.15	.88	High extent
16	efficient use of electronic library in PG school helped in your sourcing of research materials.	3.04	.98	High extent
	Grand Mean	**2.99**	**0.90**	**High Extent**

As presented in Table 3, postgraduate students reported that they make substantial use of seven out of eight electronic library resources for academic purposes in public universities in the

South East region of Nigeria as shown on items 9, 11, 12, 13, 14, 15 and 16 with mean scores of 3.07, 0.93, 0.85, 1.02, 1.13, 0.88, and 0.98, and standard deviations of 0.94, 0.93, 0.85, 1.02, 1.13, 0.88, and 0.98 respectively. This is evidenced by a grand mean of 2.99 and a standard deviation of 0.90. The mean scores for these seven items ranged from 2.97 to 3.32, all above the cutoff mean of 2.50. However, the students pointed out that their postgraduate school libraries have a limited supply of automated academic books, which are rarely used for academic purposes, as indicated by a lower mean score of 2.13 on item 10. The standard deviation across all responses ranged from 0.49 to 1.13, demonstrating a strong level of consistency and agreement among respondents concerning the use of electronic library resources in their academic work within public universities in the South East.

Hypothesis 2: There is no significant difference in the mean ratings of postgraduate students' of state and federal universities on the use of electronic library for academic purposes in public universities in South East.

Table 4: *Independent t-test Analysis of the Mean Rating of Respondents on the Significant Difference between State and Federal Universities on the Use of Electronic Library for Academic Purposes in Public Universities in South East (N = 2,896)*

Factor	University Type	N	Mean	SD	t	df	P-value	Decision
Electronic Library	State	1,579	63.93	6.01	1.89	2,894	.22	Not Sig
	Federal	1,317	68.10	5.81				

Table 4 presents a statistical comparison between state and federal universities regarding postgraduate students' use of electronic library for academic purposes in public universities in the South East region. The t-test analysis shows a t-value of 1.89 and a P-value of 0.22. Since the P-value is greater than the 0.05 significance level at degrees of freedom 2 and 2,894 (t(2,894) = 0.22, p > 0.05), the findings indicate that there is no statistically significant difference in the responses of postgraduate students from state and federal universities on the use of electronic library for academic purposes. Therefore, the null hypothesis is accepted.

4. Discussion of the Findings

As indicated by research question one in Table 1, postgraduate students reported that they make use of the Zoom application to a high extent for academic purposes in public universities within the South East region of Nigeria. The findings concur with the submission of Ohiwerei and Nden (2022), who carried out a study on the use of Zoom technology for teaching and learning among undergraduate students of Ambrose Alli University, Ekpoma, Edo State, Nigeria and found that the level of awareness of Zoom technology for teaching and learning among undergraduates was high to a great extent. The findings of Minhas, Hussain, Ghani and Sajid (2021) are not left

out, as the researchers found out that students were satisfied with the overall class management and general interface of the Zoom application and appreciated screen sharing, lecture recording features of the application. The findings of Silvia (2021) and Kim (2020) also revealed that students perceived the use of Zoom meetings as very helpful in conducting online lectures during pandemic. Furthermore, findings from hypothesis one in Table 2 revealed that there was no significant difference in the mean ratings of postgraduate students of state and federal universities on the use of Zoom application in public universities in South East. This is in agreement with the findings of Minhas *et al*. (2021), who revealed that there was no significant difference between male and female undergraduate students in exploring online learning using the Zoom application.

As presented by research question two in Table 3, postgraduate students reported that they make substantial use of electronic library resources for academic purposes in public universities in the South East region of Nigeria. This is in line with the findings of Hamis (2022), who carried out a study on use of e-library services at Mzuzu University Library by postgraduate students and found that postgraduate students have a high awareness of e-library services and that the majority of them were satisfied with the usefulness of e-library services. The findings are in disagreement with the findings of Igere (2022) and Bawa, Bawa and Arthur (2018) who revealed that students' awareness level of electronic resources was very low and that the low awareness culminated in its low utilization. This could be as a result of a lack of adoption of the computerized Database Management System (DBMS) for effective transparency of the information resources to encourage high access/usage of e-resources. Moreover, the findings in hypothesis two in Table 4 revealed that there was no significant difference in the mean ratings of postgraduate students of state and federal universities on the use of electronic libraries in public universities in the South East. This agrees with the findings of Hamis (2022), who revealed a non-significant difference between male and female postgraduate students in the use of e-library services at Mzuzu University library.

5. Conclusion
Based on the findings of the study, it was concluded that postgraduate students from both state and federal universities in the southeastern part of Nigeria agreed to a high extent that they utilize various forms of computers for academic purposes. They also agreed that to a high extent they utilize the Zoom application and the electronic library for academic purposes such as learning, personal research/development, personal growth/assignment, among others. In addition, it was concluded that there was no significant difference in the mean ratings of postgraduate students of state and federal universities on the use of various forms of computers, such as Zoom applications and electronic libraries for academic purposes in public universities in South East.

6. Recommendations
The following recommendations are made in light of the findings of this study:
1. Postgraduate students of state and federal universities, through seminars, conferences and workshops, should be encouraged to utilize various forms of computers for academic purposes. Students and faculties should also be encouraged to utilize online journals, e-books, open-access repositories, and academic search engines like Google Scholar, JSTOR, and Scopus.

2. Government and educational stakeholders (for example, NUC, TETFund) should prioritize ICT development in higher education funding and planning, such as purchasing gadgets for Zoom application, electronic multimedia, and electronic library for academic purposes.

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