

## Online Learning Platforms and Bridging of Digital Knowledge Gap among Postgraduate Students in Akwa Ibom State

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### **Abstract**

*The advent of computer and internet applications in the 21<sup>st</sup> century educational system has led to the emergence and utilization of digital applications for teaching and learning. Hence the academic landscape is evolving to embrace these innovative teaching and learning methods. This study was carried out to examine online learning platforms and bridging of digital knowledge gap among Postgraduate Students in Akwa Ibom State. Three objectives and three research questions guided the study. The study explored descriptive survey research design. The population of the study was 188 Postgraduate Students in Education, specifically (PGDE, Masters and Ph.D students in Science Education Programmes) in Akwa Ibom State. Sample size was 110 Postgraduate Education students selected for the study using accidental sampling technique. A 30 item-questionnaire on 'Online Learning Platforms in Bridging Digital Knowledge Gap (OLPBDKGQ) was used for data collection and the questionnaire was subjected to face validation. A reliability coefficient of 0.78 was obtained for the instrument using Cronbach Alpha statistics. Mean and standard deviation were used to answer the research questions. Findings showed a high level of Postgraduate Education students' knowledge of online learning platforms, moderate level of access to available online platforms and a high level of students' utilization of available platforms. It was concluded that there is high levels of knowledge, access, and utilization of online learning platforms in Akwa Ibom State. Recommendations among others were that Nigerian Communication Commission (NCC) and university management should ensure that all students have equal access to technology resources, including computers and high-speed internet and also make these resources and internet affordable.*

**Keywords:** Bridging, Digital, Gap, Learning, Platforms

### **Introduction**

Previously, materials and resources for teaching and learning were mostly printed, but in the current era of information technology, digital resources have grown rapidly, with new ones appearing on a daily interval. With the global shift to digital media and information, digital technology has become an inseparable element of the educational system and has played a key role in assisting students and education institutions in achieving their goals. Digital technologies have greatly transformed education and have offered groundbreaking opportunities and innovations, promote inclusive development, broaden educational access, enhance healthcare services, and

strengthen governance. These technologies have transformed various aspects of lives, and education is no exception. Following the emergence of digital technologies, their role in education has been notably magnified (Perienen, 2020). Digital technology provides the means for students' deeper search for information about knowledge and equips them for enhanced stimulated learning (Etiubon, Akpan, & Udoh, 2021; Umoetuk & Akpan, 2023). Akpan (2024) observed that the education sector too is witnessing a paradigm shift by using digital resources in instructional practices to strengthen students learning experiences. One of the primary benefits of digital technologies in education is the accessibility it provides. It has grown vast in education such that has changed learning from talk-to-chalk to online leaning platforms and these makes learning more engaging and interactive (Akpan, Itighise, & Umo 2022).

Digital gap is a new form of social inequality derived from the unequal access to the new information communications technologies, by gender, territory, and social class. Digital gap, referred to as digital divide, is the disparity between individuals, household, businesses and communities in terms of access to, use of or knowledge of digital technology, particularly access to modern information and communication technology. Digital knowledge gap is the disparity in individuals' ability to access, understand and effectively use digital technologies and information. It is not just about having or not having internet access, but about what people know and can do with digital tools (Okocha & Edafewotu, 2022.).

According to Itighise and Akpan (2023) in terms of academic achievement, limited access means, missed online classes, inability to submit assignment, lack of digital skills, limited or missed career opportunities (online certification, job applications, interviews, internship and meetings). Bridging this gap requires internet access and affordable technology, as well as providing digital literacy training and inclusive education policies. It is essential for academic outcomes, future activities, ensuring equal opportunities in the digital age, promoting social equity, and fostering inclusive economic growth (Akpan, *et al.* 2024).

Online learning platforms are webspace or portals for educational content and resources that offer students everything they need at a go (lectures, resources, opportunities to meet and interact with other students), and more. Online learning platforms as digital tools allow learners to access educational content anytime, anywhere, breaking down geographical barriers and providing opportunities for lifelong learning (Akpan, *et al* 2024). Awodoyin *et al.* (2024), found that they are more effective than printed materials in terms of time, space and financial resources. Unlike traditional classrooms with fixed schedules, online learning platforms allow students to study independently, fitting education around their personal and professional lives. The flexibility of these platforms caters to diverse individual learning styles and enable personalized and self-directed learning experiences. Online learning platforms, such as Zoom, Google-hangout or Google-meet, WhatsApp, YouTube, Skype, ChatGPT, Coursera, edX, and Khan Academy, have

revolutionized the educational landscape by making high-quality education accessible to a global audience (Ojelade *et al.*, 2022).

The incorporation of interactive online platforms in teacher education has emerged as a key strategy to enhance the academic achievement of preservice teachers (Atabang & Babayemi, 2024). The online learning platforms considered in this study are; Zoom, Google-meet, WhatsApp, YouTube, Skype and ChatGPT in bridging the digital knowledge gaps among Postgraduate students in Akwa Ibom State.

Zoom platform allows conferences and discussion to take place without the physical presence of learners and the instructor. Teachers can create, distribute, and mark assignments all within the google ecosystem. Atabang, and John, (2024) opined that with the advent of information and communication technology (ICT), zoom platform is among the catalysts that will drive learning. Hence, zoom technology should become an integral part of teaching and learning amongst students. After zoom session, students continue their discussion and share quick updates through platforms like WhatsApp.

WhatsApp is a popular messaging application that allows users to send text messages, voice messages, images, videos, documents, and make voice and video calls over the internet. It is a platform that enhances accessibility, encourages cooperation, and intensifies students' motivation to take active part in academic assignments. Johnson and George (2014), reported that student could remain at various geographical locations and share unlimited ideas by making voice calls and uploading documents and images, at a relatively lower cost compared to the transportation costs required for students to connect on their university campuses for lecture. In addition, Akpan *et al.* (2022) reported that about (70%) of students are benefiting from the application of WhatsApp to education compared to physical classroom lectures, implying that WhatsApp is convenient for teaching and learning in tertiary institutions. For more interactions and communication, students may also use google hangouts.

Google hangout has become a suitable choice for teaching and learning in higher education because the platform offers features such as the ability to have more than 100 people in a class session (depending on the activated plan). It also has other unique features like being free for a group conference. Video conferencing and class sessions on google hangouts can be recorded and uploaded to YouTube for viewing and sharing. Google hangout also allows screen captures, screen shares, and remote desktop control, allowing users to control a computer monitor from the other end of the room during the video conferencing. Other than that, the platform can also be integrated with Google Calendar where class sessions can be scheduled, and the connection links can be sent earlier to the students (Minina & Mabrouk, 2019). While hangouts are helpful for communication, many students rely on YouTube to explore topics further through tutorials and videos.

According to Ukoba *et al.* (2024), YouTube is described as a popular online platform for accessing materials and video tutorils created by people on various topics. It is identified as one

of the most important types of social media in the educational system, offering dynamic opportunities for non-traditional teaching and learning patterns. Almobarraz (2018) found that YouTube is not only beneficial for students as a learning tool but also an effective tool for teaching common skills and tasks in both formal and home settings. And that the use of YouTube in the classroom has a positive impact on overall student learning. Students can independently learn on their own merely watching classes on YouTube or reading through notes and use their phones as resource and learning device (Akpan et al., 2022). Youtube supports diverse leaning styles, but for direct communication with online study group or international friends Skype is preferable.

Skype, a widely used communication tool, especially the (free video, voice calls, messaging and screen sharing) have significant importance, particularly in influencing students' academic achievement. Studies have highlighted its role in facilitating interviews, enhancing digital literacy and interaction in distance learning settings. It is observed that Skype can be a valuable platform for educational purposes (Hidayati *et al.*, 2021). While Skype helps students stay connected, those looking for instant help with schoolwork turn to AI tools like ChatGPT.

ChatGPT is an AI powered assistant the helps students with homework, writing, coding and understanding complex topics. It uses a natural language processing system designed to generate structured, cohesive, and informative responses akin to those crafted by humans, tailored to user prompts (Ezeah & Ozioko 2024). ChatGPT can enhance individualized learning encounters by addressing student inquiries and delivering educational materials (Zhai et al., 2021).

Various studies have highlighted the importance of students' experiences in online platforms. Ojelade *et al.* (2022) observed that online learning platforms are known, but they yet to gain grounds among the teaching strategies used in public universities. And the same time access to facilities and online platform was low. In another study, Anyanwu et al. (2023), observed lecturers had knowledge of virtual learning platforms in tertiary institutions, their level of accessibility was moderate and utilization was low. Similarly, Anuoluwa and Fajiwe (2024) observed that zoom, skype and WhatsApp were frequently used remote learning platforms by science lecturers for teaching in universities in South-West Nigeria. Awodoyin *et al.* (2024) in their study also found that undergraduate students are highly aware of online learning platforms. Okoroh and Uche (2024) in their study showed that (73.3%) of students were aware of zoom technology, while Atabang and Babayemi (2024) observed there was a moderate level of integration of zoom technology as pedagogy for teaching Postgraduate students. Akpan (2024) observed that Pre-service undergraduate teachers had moderate knowledge of emergent digital technologies (Zoom, YouTube, Chatgpt and google search) for learning.

Furthermore, Olom and Nyiam (2025) found that students to a large extent utilized internet resources for learning. Ezeah and Ozioko (2024) also found that knowledge of Chatgpt was low amongst students, likewise their usage. Nnaemeka and Ogunbadejo (2024) noted that students had a high level of awareness, knowledge and widespread adoption and utilization of Chatgpt.

Ogirima *et al.* (2021) found that the perception of future teachers towards the usefulness of YouTube for teaching-learning in schools was high. In another study, Akpan *et al.* (2023) observed that teachers did not sufficiently access and utilize technology in their teaching because they lack digital literacy and skills to manipulate the different technological devices.

Despite attempts to incorporate interactive online platform in teacher education, teachers especially the pre-service have developed different attitude towards the use of online learning platform, this may be due lack of devices, technical skills, stable internet, as well as lack of connection with students and frustration faced by less tech-savvy students (Ojelade *et al.*, 2022; Itighise, 2016). Some perceive the use of online platform as being boring and difficult to use (Umoetuk & Akpan, 2023), while some are still not knowledgeable of the usefulness of online learning platforms, their level of access may be minimal.

### **Statement of the Problem**

Research has shown that university students and lecturers are the most users of, and nearly dependent on different types of technology such as smartphones and apps like google hangout, zoom, YouTube, ChatGPT and the internet. In spite of over dependence on these technologies, students' performance and attitude to learning are still questioned. This could be because most students use these digital resources and applications mostly for personal and social purposes and not fully for learning. It has been observed that students' learning outcomes have been poor due to the instructional media (method and resources) adopted by lecturers and lack of ideas in using available online resource appropriately in getting educational materials to support teaching and learning. There is students' lack of interest in online learning platform due to lack of integration in teaching, no knowledge, no proper orientation in operating these online platforms, lack of digital skills and lack of access to supporting equipment like laptops, smartphones and internet.

Even though students have deployed online learning platforms in their educational activities, the issue of low knowledge, understanding, accessibility and utilization elude so many of them from making use of online learning platforms as a way out. Hence, the need for this study.

### **Purpose of the Study**

The purpose of the study was to examine online learning platforms and bridging the digital knowledge gap among Postgraduate Students in Akwa Ibom State. Specifically, the study sought to;

1. Assess Postgraduate Education students' knowledge of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State.
2. Examine Postgraduate Education students access to online learning platforms and bridging digital knowledge gap in Akwa Ibom State.

3. Examine Postgraduate Education students' utilization of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State.

### **Research Questions**

The following research questions guided the study

1. What is the level of Postgraduate Education students' knowledge of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State?
2. What is the level of Postgraduate Education students' access to online learning platforms and bridging the digital knowledge gap in Akwa Ibom State?
3. What is the level of Postgraduate Education students' utilization of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State?

### **Methodology**

A descriptive survey design was used for the study to collect responses on the subject matter. The population of the study comprised 188 Postgraduate Students in Education, specifically (PGDE, Masters and Ph.D students in Science Education Programmes) in Akwa Ibom State from University of Uyo and Akwa Ibom State University as they are the only school that run Postgraduate Diploma in Education – PGDE and Postgraduate Science Education programmes. One hundred and twelve (112) students were selected for the study using accidental sampling technique. Sample was drawn based on the students available at the time of questionnaire administration. A 30 item-questionnaire on 'Online Learning Platforms in Bridging Digital Knowledge Gap (OLPBDKGQ)' was used for data collection. The instrument was developed on a four-point rating scale and was validated by experts in Education Technology, Measurement and Evaluation, and Science Education to ascertain its face validation.

The instrument was trial tested on 20 respondents who were not used in the study and a reliability coefficient of 0.78 was obtained using Cronbach Alpha coefficient. Hard copies of the instrument were distributed physically to respondents, while electronic copies (Google form) was developed, and the link was sent to the respondents during the Zoom classes and the Class WhatsApp Platforms. 110 Postgraduate students responded to the questionnaire. The responses obtained from both methods of distribution were analyzed using mean and standard deviation. To make decisions as regards research questions, mean score of 2.50 was used as the basis for decision making, meaning that any item with mean score of 2.50 and above was accepted, while any mean below 2.50 was rejected. Whenever the cluster mean score falls between: 1.00-1.49, 1.50-2.49, 2.50-3.49 and 3.50-4.00, it was taken to indicate: Low Level (LL), Moderate Level (ML), High Level (HL), Very High Level (VHL) for rating the level of knowledge, access and utilization of online learning platforms.

## Results

**Research Question 1:** What is the level of Postgraduate Education students' knowledge of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State?

**Table 1: Summary of Mean and Standard Deviation scores of the level of Postgraduate Education students' knowledge of online learning platforms ( $n = 110$ )**

S/N	Knowledge of Available Online Learning Platform	$\bar{x}$	SD	Decision
1	I have knowledge of Zoom technology for online classes or group discussion with classmates.	2.38	1.17	Moderate Level
2	I am familiar with ChatGPT for study assistance.	2.45	0.80	Moderate Level
3	I am familiar with WhatsApp for educational purposes.	3.47	0.57	High Level
4	I am always faced with challenges using Zoom for Online classes.	2.72	1.05	High Level
5	I regularly use WhatsApp to communicate with classmates.	3.49	0.80	High Level
6	I find ChatGPT as a helper for understanding difficult concepts.	3.01	0.90	High Level
7	I find YouTube tutorials helpful for my studies.	3.41	0.72	High Level
8	I rarely experience disruptions during Zoom meetings.	2.46	1.00	Moderate Level
9	I am not familiar with how to use Google Meet for online classes.	2.38	1.04	Moderate Level
10	I am aware of the features of Google Meet that support learning (screen sharing, recording).	2.30	1.01	Moderate Level
<b>Cluster Mean</b>		<b>2.80</b>	<b>0.49</b>	<b>High Level</b>

Considering research question one, the mean scores for the response of the students on the level of Postgraduate Education students' knowledge of online learning platforms. The result in Table 1 shows that the mean scores of items 3,4,5,6 and 7 are above the cut-off point of 2.50 while that of items 1,2,8,9 and 10 are below the cut off mark. Which means that students with mean rating of (3.47, 2.72, 3.49, 3.01, 3.41) were accepted to have knowledge of online learning platforms. The respondents with mean rating of (2.38, 2.45, 2.46, 2.338, 2.30) were rejected. It is also noted that the standard deviation scores of the respondents fall within a range of 0.57 to 1.17. These relatively low values of standard deviation indicate that the variation among the respondents' scores is minimal, meaning the individual scores are closely grouped around the mean. However, the cluster mean of 2.80 for all the items indicates that there is high level of Postgraduate Education students' knowledge of online learning platforms.

**Research Question 2:** What is the level of Postgraduate Education students' access to online learning platforms and bridging the digital knowledge gap in Akwa Ibom State?

**Table 2: Summary of Mean and Standard Deviation scores of the level of Postgraduate Education students access to online learning platforms (n = 110)**

Access to Online Learning Platform	$\bar{x}$	SD	Decision
1 I have reliable access to the internet for using online learning platforms	2.08	0.98	Moderate Level
2 I have access to a computer or device that supports Zoom for online classes.	2.16	1.11	Moderate Level
3 I have access to Skype for online communication with classmates	1.50	1.04	Moderate Level
4 I have access to YouTube for educational videos and tutorials.	3.00	0.91	High Level
5 I have access to multiple online learning platforms since it has altogether enhanced my learning abilities.	2.62	0.96	High Level
6 Discussion with both authors and peers, sharing of ideas on Google Hangout has overall enhanced my learning experience.	2.14	1.01	Moderate Level
7 Google Hangout meetings start and end on time without technical issues.	1.98	1.00	Moderate Level
8 I have difficulty accessing learn online to learn because of the poor network connection experienced in the App.	3.00	0.97	High Level
9 I can access all the necessary educational content on YouTube for my studies.	2.35	0.96	High Level
10 I have difficult accessing online internet due to cost of data	3.10	0.90	High Level
<b>Cluster Mean</b>	<b>2.39</b>	<b>0.52</b>	<b>Moderate Level</b>

With respect to research question 2, the mean scores for the response of the students on the level of Postgraduate Education students' access to online learning platforms. The result in Table 2 reveals that the mean scores of items 4, 5, 8, and 10 are all up to 2.50 and above, while items 1,2,3,6,7,9 are below 2.50, the cut off mark. This means that the respondents with mean rating of (3.00,2.62,3.00,3.10) were accepted as having access to online learning platforms. Respondents with mean rating of (2.08, 2.16, 1.50, 2.14,1.98,2.35) were rejected. It is also noted that the standard deviation scores of the respondents fall within a range of 0.90 to 1.11. These relatively low values of standard deviation indicate that the variation among the respondents' scores is minimal, meaning the individual scores are closely grouped around the mean. However, the cluster

mean of 2.39 for all the items indicates that there is moderate level of Postgraduate Education students access to online learning platforms.

**Research Question 3:** Examine Postgraduate Education students' utilization of online learning platforms and bridging the digital knowledge gap in Akwa Ibom State.

**Table 3: Summary of Mean and Standard Deviation scores of the level of Postgraduate Education students' utilization of online learning platforms (n = 110)**

Utilization of Online Learning Platforms	$\bar{x}$	SD	Decision
1 I regularly use ChatGPT for help with homework or assignments.	3.45	0.79	High Level
2 I always use Zoom platform for virtual meetings and classes and it has positively influenced my learning experience.	2.01	1.10	Moderate Level
3 I regularly use Skype for group study or project discussion.	2.26	1.04	Moderate Level
4 I regularly use Google Meet for virtual classrooms.	2.45	0.96	Moderate Level
5 I ask ChatGPT for explanations on difficult topics	3.27	0.83	High Level
6 I use ChatGPT regularly for assistance with my coursework	3.36	0.80	High Level
7 I utilize Zoom's features (e.g., screening sharing, and breakout rooms) during online sessions.	1.96	1.02	Moderate Level
8 I conduct group study sessions on Skype.	2.38	1.04	Moderate Level
9 I use Skype for project discussion and planning.	2.48	1.07	Moderate Level
10 I watch educational videos on YouTube to supplement my learning.	3.40	0.80	High Level
<b>Cluster Mean</b>	<b>2.66</b>	<b>0.56</b>	<b>High Level</b>

Considering research question 3, the mean scores for the response of the students on level of Postgraduate Education students' utilization of available platforms. The result in Table 3 reveals that the mean scores of items 1, 5,6, and 10 are above the cut-off point of 2.50, while those of items 2,3,4,7,8 and 9 are below the mark. This means that the respondents with mean rating of (3.45,3.07,3.16,3.40) accepted utilizing online learning platforms. While respondents with mean rating of (2.01, 2.26,2.45,1.96,2.38,2.48) were rejected. It is also noted that the standard deviation scores of the respondents fall within a range of 0.79 to 1.10. These relatively low values of standard deviation indicate that the variation among the respondents' scores is minimal, meaning the

individual scores are closely grouped around the mean. However, the cluster mean of 2.66 for all the items indicates that there is high level of Postgraduate Education students' utilization of online learning platforms.

### Discussion of Findings

The result of the level of Postgraduate Education students' knowledge of online platforms revealed that there is high level of Postgraduate students' knowledge of online platforms. This can be attributed to the fact that many students today are considered digital natives, meaning they grow up in a world where digital platforms and internet resources are already established. This early exposure often translates to a natural familiarity and ease with using technology for various aspects of learning. The finding lends credence to that of Ojelade *et al.* (2022), Anyanwu *et al.* (2023), Awodoyin *et al.* (2024) and Nnaemeka and Ogunbadejo (2024) observations that students had a high level of knowledge and awareness of online learning platforms. The finding is contrary to the observations of Akpan (2024), Atabang and Babaymi (2024) that knowledge of online platform was moderate and Ezeah and Ojioko (2024) who reported that knowledge of Chatgpt online platform was low amongst students.

The result of the level of Postgraduate Education students access to online learning platforms revealed that there is moderate level of Postgraduate Education students access to online platforms. This finding is possible in view of the fact that even though advances in technology are made and devices such as laptops, tablets, and smartphones are widely available, they are not affordable because of the economy and high cost of living. Digital devices and internet connectivity are expensive; therefore, most people cannot afford to buy them. The moderate level of access to online learning platform could also be due to lack of technological skills and competence, as some Postgraduate students are advanced in-service teachers, many of them lack digital literacy and skills to manipulate the different technological devices. The finding lends credence to Anyanwu *et al.* (2023) observations that level of accessibility to virtual learning platforms in tertiary institution was moderate. Likewise, Akpan (2024); Atabang and Babayemi (2024) reported moderate levels of integration of zoom technology as pedagogy for teaching Postgraduate students. The moderate levels of accessibility, also aligns with that of Akpan *et al.* (2023) who found that pre-service teachers did not sufficiently access technology due to lack of digital literacy and skills to manipulate the different devices. The finding is contrary to Ojelade *et al.* (202) who reported that access to facilities and online platforms was low.

The result of the level of Postgraduate Education students' utilization of online learning platforms revealed that there is a high level of utilization of online platforms. This finding can be attributed to the fact that many online platforms support collaborative learning through features such as zoom, google hangout, group projects, and shared resources. Students can connect with peers, engage in discussions, and collaborate on projects, fostering a sense of community and

shared learning. The finding lends credence to that of Anuoluwa and Fajiwe (2024) who observed that zoom, skype and WhatsApp were frequently used remote learning platforms by science lecturers for teaching. It is also in line with Nnaemeka and Ogunbadejo (2024) who found students had a high level of utilization of virtual learning platforms in tertiary institutions. Olom and Nyiam (2025) also note that students to a large extent utilized internet resources online for learning. The result contradicts that of Ezeah and Ozioko (2024); Okoroh, and Uche, (2024) and Anyanwu et al. (2023) who revealed that utilization of virtual learning platforms in tertiary institutions, was low.

### **Conclusion**

In conclusion, the study showed that Postgraduate education students exhibit a high level of knowledge and utilization of online learning platforms, while accessibility was moderate. Students view online learning platforms as valuable assets in their educational pursuits and the integration of interactive tools in online courses enrich learning experiences. This study underscores the significant advantages of online learning platforms for Postgraduate students, particularly in terms of flexibility, accessibility and enhanced educational experiences. It was concluded that online learning platforms had significant positive impact in bridging the digital knowledge gap among Postgraduate students in Akwa Ibom State.

### **Recommendations**

Based on the findings of the study, the following recommendations were made:

1. Management of universities should ensure that all students have equal access to technology resources, including computers and high-speed internet.
2. There is need for training on the use of all online platforms by both students and teachers.
3. The Nigerian government should make the cost of digital tools affordable.
4. Nigerian Communication Commission (NCC) should implement low cost of data plan and free internet access.
5. Teachers should encourage collaborative projects that require the use of online platforms, which will promote shared learning experiences.

### **References**

- Akpan, A. O. (2024). Knowledge, utilization and perception of emergent digital technologies in pedagogy by pre-service science teachers in Nigeria. *Journal of Institutional Research, Big Data Analytic and Innovation*, 1(1), 44 – 55.
- Akpan, A. O., Akpan, I. F & Umo E. B. (2023). science Teachers awareness and competencies needed in utilization of 21<sup>st</sup> century skills in teaching in Akwa Ibom State. *International Journal of Educational Research and Human Development*, 4(1), 13-31.

- Akpan, A. O., Itighise, A. E. & Umo E. B. (2022). Integration of Digital Technologies in STEM teaching and learning in Universities in Akwa Ibom State. *The Nigerian Academy of Education Conference Proceeding*, 162-177.
- Akpan, A. O., Oyakhirome, A.H. & Udoh, A. P., (2024). Harnessing artificial intelligence for 21st century skills acquisition and undergraduate students 'preparation for sustainable lifelong learning in Nigeria," *International Journal of Research and Innovation in Social Science (IJRISS)*, 8(3S),069-1083.
- Almobarraz, A. (2018). Utilization of YouTube as an information resource to support university courses. *The Electronic Library*, 36(1), 71-81.
- Anuoluwa, F. A.. & Fajiwe, O. T. (2024). Utilization of remote teaching platforms by science lecturers in some selected federal universities in South-West. *Unizik Journal of Research in Library and Information Science*, 8(1&2), 86-100.
- Anyanwu, C. J., Atteng, C. J, Ibeabuchi, G. I., Orji, O. C. (2023). Lecturers' knowledge, access and utilization of inclusive virtual learning platforms in Nigerian tertiary education: Implications for learners with visual and hearing impairments. *Journal of Educational Research in Developing Areas*, 4(1), 39-49.
- Atabang, A. A.& Babayemi, J. O. (2024). Integration of Zoom platform as an innovative pedagogy in teaching postgraduate students in Akwa Ibom State University. *Global Journal of Academic Research Forum*, 1(1), 77-91.
- Awodoyin, A. F, Oso,O. O. & Adeogun, O. (2024). Librrary and information science undergraduates usage, experience and perceptions about online learning platforms in universities in South-West Nigeria. *The Catalyst Journal of Library and Information Literacy*, 3(2), 233 -254.
- Etiubon, R. U., Akpan, O. & N. M. Udoh, (2021). Enhancing retention of water pollution using computer tutorials and drill-practice among first year science education students of University of Uyo, Nigeria. *European Modern Studies Journal*, 5(3), 139-152.
- Ezeah, G. & Ozioko, C. M. (2024). Knowledge, attitude and use of ChatGpt services among undergraduates of University of Nigeria, Nsukka. *Instructional Journal of Management, Social Science and Peace and Conflict Studies*, 7(4), 163-175.
- Hidayati, A. N., Ramalia, T., & Abdullah, F. (2021). Leveraging Skype-based webinars as an English language learning platform. *Al-Ishlah: Jurnal Pendidikan*, 13(1), 10-20.

- Itighise, A. E. (2016). Innovation in Higher Teachers Education: An imperative for achievement of sustainable national development. *Journal of Education Media and Technology*, 21(1), 264-273.
- Itighise, A. E., & Akpan, A. O. (2023). Awareness and utilization of web2.0 technology for learning among bscience teacher trainees in Akwa Ibom State. *Zamfara International Journal of Education*, 3(6), 104-119.
- Johnson, Y & George, D. E., (2014). The impact of whatsapp messenger usage on students performances in tertiary institution in Ghana. *Journal of Education and Practice*, 5(6), 157- 164.
- Minina, A., & Mabrouk, K. (2019, April). Transformation of university communication strategy in terms of digitalization. In *2019 communication strategies in digital society workshop (ComSDS) 117-120. IEEE*.
- Nnaemeka, O. F. & Ogunbadejo, S. I. (2024). Awareness, knowledge and perception of chat-gpt among undergraduates of Nnamdi Azikiwe University, Awka, Anambra State. *International Journal of Research and scientific Innovation*, XI(III), 187-201.
- Ogirima, O. A., Tolulope, J. J. & Temitope, S. J. (2021). Future Teachers' perception towards the use of Youtube for teaching-learning activities in Nigerian basic schools. *Mimbar Sekolah Dasar*, 88(1), 81-95.
- Ojelade, I. A. Aregbesola, B. G. & Haastrup, D. T. (2022). Online teaching platforms and effective teaching and learning of Science Education in Nigeria public universities. *Innovare Journal of Education*, 10 (6), 7-13.
- Okocha, D.O & Edafewotu, E. (2022). Bridging the digital divide in Nigeria. *Journal of Developing Communication*, 33(1), 45-54.
- Okoroh, J. P, Uche, O. E. (2024). Awareness and utilization of zoom video conferencing app among agricultural development programme staff in Imo State, Nigeria. *TWIST Journal*, 19(2), 104-109.
- Olom, P. & Nyiam, P. A. (2025). Assessment of internet resources utilization by Business Education students for learning in the university of Calabar. *Global Journal of Educational Research*, 24, 9-17.
- Perienen, A. (2020). Frameworks for ICT integration in mathematics education: A teacher's perspective. *Eurasia Journal of Mathematics, Science and technological Education*, 16(6), 1875-1887.

Ukoba, E. O., Ukwuezeh, C. P. Ugbordiegwu, V. C. (2024). Extent of utilization of youtube in the teaching and learning of listening comprehension in secondary schools in Nsukka Local Government area, Enugu State, Nigeria. *African Journal of Science Technology and Mathematics education*, 10(6), 944 – 951.

Umoetuk, E. & Akpan, A. O. (2023). Computer graphics, flipped classroom instructional strategies and students' performance in Basic Science and Technology in Akwa Ibom State. *Inter-Disciplinary Journal of Science Education (IJ-SED)*, 5(1), 34-41.

Zhai, X., Chu, X., Chai, C. S., & Li, Y. (2021). A review of Artificial Intelligence (AI) in education From 2010 to 2020. *Complexity*, 2021(6), 1–18.