Interactive Board and Projectors: An Unusual Combination towards Enhancing Effective Learning Outcomes among Students in Public Universities in Cross River State

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Abstract

This study examined the impact of interactive board cum projectors on effective learning outcomes among students in public universities in Cross River State. To carry out the study, three research questions and three commensurate hypotheses was raised based on the objectives of the study. The descriptive survey research design was adopted for the study. The population consisted of 2650 students of Educational Technology Department from the University of Calabar (Unical) and University of Cross River State (Unicross) which were the two public universities in Cross River State. The study sample consisted of 346 students from the department of Educational Technology, University of Calabar and University of Cross River State. Two instruments were used for data collection: a 35-item questionnaire titled "Interactive Board Cum Projectors and Learning Outcomes Questionnaire (IBPLOQ)" and a "Learning Outcome Assessment Tool (LOAT)". The Pearson product moment correlation analysis was employed to test the hypotheses under study at 0.05 level of significance. The results revealed that the use of interactive board cum projectors has a significant positive impact on effective learning outcomes among students in public universities in Cross River State. Based on the findings, it was recommended among others that the management of public universities in Cross River State should invest in the procurement and installation of interactive boards cum projectors in all classrooms and lecture halls to enhance students' interest in learning.

Keywords: *Interactive Board; Projector, Effective Learning, Student, Public Universities, Cross River State.*

Introduction

The integration of technology in education has become a crucial aspect of modern teaching and learning (Koehler & Mishra, 2009). Interactive boards and projectors are two technological tools that have been widely adopted in educational institutions (Gulsecen & Dalveren, 2016). However, the use of interactive boards cum projectors as a combined tool is a relatively new concept that has not been fully explored (Hsu et al., 2013). This study aims to investigate the impact of interactive board and projectors on effective learning outcomes among students in public

universities in Cross River State. The study is motivated by the need to improve the quality of education in Nigeria, particularly in the area of technology-enhanced learning (Federal Ministry of Education, 2013). Previous studies have shown that the use of interactive boards and projectors can enhance student engagement, motivation, and learning outcomes (Beeland, 2002; Cakir, 2017). However, there is a dearth of research on the specific combination of interactive boards and projectors as a tool for enhancing learning outcomes.

Effective technology integration enables teachers to create personalized learning environments, catering to diverse learning styles and needs. Digital tools, such as learning management systems, educational software, and multimedia resources, provide interactive and immersive experiences that foster deeper understanding and retention. Moreover, technology facilitates collaboration, communication, and critical thinking skills, essential for success in the 21st century. According to a recent study, "technology-mediated instruction can promote active learning, increase student engagement, and support the development of essential skills, such as problem-solving and collaboration" (Bao, 2022).

The rapid advancement of information technology and its integration into education have accelerated the digitization of educational tools. Traditional classroom equipment, such as chalkboards and standard whiteboards, lack the interactive capabilities required for contemporary educational practices, leading to their gradual replacement by Interactive Whiteboards (IWBs). Innovators and leading developers of interactive technologies, highlighted the potential of IWBs for collaboration, enhanced student learning, and streamlined lesson planning in their classroom Nkanu, et al. (2023). This potential has been recognized by educators, who remain the primary users of IWB technology (Ran et al., 2018). Despite the widespread adoption of IWBs in educational settings, critical questions remain regarding their overall impact and the specific areas of focus for researchers and practitioners. These include, but are not limited to, the efficacy of IWBs in diverse learning environments and their role in fostering student engagement.

It’s believed that IWBs have obvious advantages in reinforcing students’ motivation and engagement in learning because the interactive features of IWBs manage to attract students’

attention and increase their concentration, and thus enhancing their learning outcomes (Tsayang, et al 2020; Dallimore, et al. 2017). As a new type of educational technology, IWB technology has been widely spread and used in the global range along with the rapid development of information and communication technologies (ICT) Imoke, et al. (2024). The potential benefits of IWB to provide a better teaching and learning environments for the development of education have been recognized by many countries and educational institutions (Bradley & Lomicka, 2017). While some researchers argued that the IWB technique should be assessed as part of the entire teaching subjects, greater attention has been paid to the teaching methods and teaching strategies associated with the use of IWBs (Cheang, 2019; Rana, et al. 2018),

As interactive projector is a new technology released recently, its actual teaching efficiency and effectiveness have not been empirically addressed so far. This study therefore focuses on investigating the impact of integrating interactive projectors into biology teaching from the aspect of classroom interactivity. Traditional IWBs have large display devices connected with computers, and when disconnection occurs, the instruction is disrupted and students' attention is interrupted. Furthermore, in order to easily manipulate computers and display boards, instructors or students are often restricted to stand in front of IWBs or other interactive technologies to utilize it. By using the interactive projectors, instructors and students can remotely

control all objects displayed from a distance, with no need to change classroom settings whilst enjoying the

functionalities that IWBs or computers provide. Most researches point out that interactive technologies, such as interactive projectors and IWBs, play a crucial role in improving teacher-pupil interactivity. However, some studies indicate that teacher-centred teaching is unexpectedly strengthened, when the educational media, especially interactive technologies, are newly introduced into the classes (Kennewell, 2014; Hennessy, et al. 2018). How to measure and clarify the interactivity in the classrooms is an important issue. As some researches point out, the reason ICTs can support teaching activities depends mostly on their intrinsic and constructed features

(Kennewell & Beauchamp, 2017; Johnson et al. 2021), and once these features are perceived and transformed into external representations, they become actions. Hence, this study attempts to investigate these actions as indices of interactivity in the classrooms and further to examine the perceived effectiveness

Student outcomes refer to the measurable results of a student's educational experience, encompassing their interest, retention, and performance. Interest refers to the student's motivation and engagement in learning, while retention pertains to their ability to recall and apply previously learned knowledge. Performance, on the other hand, refers to the student's achievement and proficiency in a particular subject or skill. According to a study by the National Center for Education Statistics (NCES), students who use interactive whiteboards, such as SMART Boards, show improved academic performance, increased engagement, and better retention of material (Okoye, 2018; Imoke, et al. 2023). This suggests that the use of technology can positively impact student outcomes. A recent study by Huang, et al. (2022) also found that the use of interactive technologies in the classroom can enhance student engagement, motivation, and academic achievement. By measuring student outcomes, educators can assess the effectiveness of their instructional methods and make data-driven decisions to improve teaching and learning

Student interest is a critical factor in the educational process, as it can significantly impact students' motivation and engagement in learning. In the context of this study, student interest refers to the level of enthusiasm and motivation students have towards learning with interactive boards cum projectors. Research has shown that interactive technologies, such as interactive whiteboards, can increase student interest and engagement in learning (Huang et al., 2022; Ulonnam, et al. 2024). Additionally, a study by Özçınar (2016) found that the use of interactive whiteboards can lead to increased student motivation and interest in learning. By examining the impact of interactive boards and projectors on student interest, this study aims to contribute to the existing body of research on the effectiveness of interactive technologies in education

Okoye (2018) refers to retention as the process of maintaining the availability of new meanings or some part of them. Learning, need to be presented to the learners in a way or method

that touches their sub consciousness, which can trigger quick recalling of the concepts, processes and skills being taught and learnt. Learning experiences in which the contents and materials are presented in a form that appeal to multiple human senses simultaneously and to encourage active involvement of students in leaning activities have been associated with longer retention Nkanu et al. (2023). Again, Okoye (2018) stated that active participation during instruction increases learning and retention. In predicting academic achievement and retention some scholars and researchers view gender as a relevant factor to be reckoned with while others believe that gender is not a relevant.

This study seeks to fill this knowledge gap by exploring the effectiveness of interactive board and projectors in enhancing learning outcomes among students in public universities in Cross River State. The study employed a descriptive survey research design and used a structured questionnaire and observation checklist as data collection instruments. The findings of this study will contribute to the existing body of knowledge on technology-enhanced learning and will provide insights for educators, policymakers, and researchers.

By exploring the impact of interactive board and projectors on learning outcomes, this study aims to provide a framework for enhancing the quality of education in universities in Cross River State.

Theoretical background

Need Achievement Theory of Motivation and the use of Computer Technology for Stimulating Students' Interest in Learning by Biehler and Snowman (1993)

According to Biehler and Snowman (1993), the Need Achievement Theory of Motivation proposes that students' motivation to learn is influenced by their need for achievement, which can be stimulated through the use of computer technology that provides opportunities for mastery, feedback, and self-improvement. The authors suggested that computer technology can be an effective tool for stimulating students' interest in learning by providing interactive and engaging learning experiences that cater to their individual needs and abilities.

Furthermore, Biehler and Snowman (1993) stated that motivation is typically defined as the forces that account for the arousal, selection, direction, and continuation of behaviour. According to the author, motivation refers to all those phenomena which are involved in the stimulation of action towards particular objectives where previously there was little or no movement towards those goals. Both definitions imply that motivation comes from within a person. Therefore, teachers' responsibility is to create learning environment that will enhance students' motivation to pursue academic goals actively over a long period of time. The need achievement motivation theory rests on the belief that most persons want to achieve and experience levels of aspiration in a given environment. Contributors of achievement motivation theory are John W. Atkinson and David McClelland. According to Atkinson when an individual is actively involved on a task, he sets himself a standard to conquer (Biehler & Snowman, 1993). This standard is called the level of aspiration. They further pointed out that level of aspiration is a longing for what is above one, with advancement as its goal. Aspiration has to do with the desire to improve or to rise above one's present status. There are two set of factors which interacts to determine the level of aspiration. They are the personal factors and the cultural factor/environmental factors.

The authors explained that personal factor relate to such personality traits as intelligence, interest, gender, self-concept, activity level, socio-economic status and previous training experience. Cultural and environmental factors include parental ambition, social values and social reinforcement. Need achievement is more influenced by environmental factors. Some environmental factors encourage the development of immediate aspiration. According to Ngwoke (2004) the implication of need achievement theory is that the teacher should create learning environment conditions that will help learners adequately assess their abilities and opportunities available so that they can set realistic and attainable goals. In this way learners will experience success in school activities and thereby build positive self-concept which enhances need achievement motive.

Owing to the dominance of the teacher in the traditional teaching approaches, students are not engaged in the classroom activities because such environment is not provided. This results into

rote learning and memorization of facts with little transfer of knowledge. Ngwoke (2004) observed that the method hardly increased students' enthusiasm and interest. Teaching methods based on cognitive learning theory such as the use of computer technology provides students interaction with the learning environment which invariably provides meaningful learning activities. Meaningful learning activities built on prior knowledge motivate students and foster their interest in their effort to executively control their own cognitive process. The Need Achievement Theory is relevant to this study as it suggests that the learning environment created by the interactive board and projectors will enable students to assess their abilities, identify available opportunities, set realistic goals, and strive to achieve them, thereby enhancing their motivation and learning outcomes in terms of their interest, retention and performance.

The quality of education in public universities in Cross River State has been a subject of concern for stakeholders in recent years. Despite efforts to improve the education sector, students' learning outcomes remain a challenge. One of the factors contributing to this challenge is the traditional teaching method, which often fails to engage students and promote effective learning. The use of technology in education has been identified as a potential solution to this problem. Interactive boards and projectors are two technological tools that have been widely adopted in educational institutions. However, their effectiveness in enhancing learning outcomes is still a subject of research.

Public universities in Cross River State face numerous challenges, including inadequate infrastructure, outdated teaching methods, and limited resources. These challenges can hinder the effective use of technology in education, thereby affecting students' learning outcomes. Cross River State is one of the states in Nigeria with a high number of tertiary institutions. Despite the presence of these institutions, the state still grapples with issues related to education, including poor learning outcomes. Students in public universities in Cross River State often complain about the lack of engagement and motivation in the classroom. This can be attributed to the traditional teaching method, which often focuses on lecturing rather than interactive learning.

The use of interactive boards and projectors can enhance students' engagement and motivation in the classroom. However, the effectiveness of these tools in enhancing learning outcomes is still a subject of research. There is a need to investigate the impact of interactive boards and projectors on students' learning outcomes in public universities in Cross River State. Therefore, this study aims to fill this knowledge gap by exploring the effectiveness of interactive boards and projectors in enhancing learning outcomes among students in public universities in Cross River State.

Objective of the study

This study sought to find out:

1. how interactive boards and projectors relate to students' interest in learning in public universities in Cross River State.
2. the extent to which interactive boards and projectors relate to students' retention in learning in public universities in Cross River State?
3. How interactive boards and projectors relate to students' performance in learning in public universities in Cross River State

Research questions

The following research questions were posed to guide the study;

1. What is the relationship between interactive boards and projectors and students' interest in learning in public universities in Cross River State?
2. To what extent does interactive boards and projectors relate to students' retention in learning in public universities in Cross River State?
3. What is the relationship between interactive boards and projectors and students' performance in learning in public universities in Cross River State?

Statement of hypotheses

The following hypotheses were formulated to guide the study:

1. There is no significant relationship between the use of interactive boards and projectors and students' interest in learning in public universities in Cross River State.

2. 2. There is no significant relationship between the use of interactive boards and projectors and students' retention learning in public universities in Cross River State.
3. 3. There is no significant relationship between the use of interactive boards and projectors and students' performance in learning in public universities in Cross River State.

Methodology

This study employed a descriptive survey research design to investigate the relationship between interactive boards and projectors and learning outcomes among students in public universities in Cross River State. Three research questions and three hypotheses were formulated based on the study's objectives. The population of the study comprised 2,650 students from the Educational Technology Departments of University of Calabar (UNICAL) and University of Cross River State (UNICROSS). A sample of 346 students was selected from the population using a purposive and accidental sampling technique. By purposive, the researchers decided to use Educational Technology Department in both Universities sampled (UNICAL and UNICROSS) and by using accidental sampling, it means that the researchers only gave the instrument to the students they met at the time of administration and were willing to participate in the study. Two instruments were used for data collection: the Interactive Board and Projectors and Learning Outcomes Questionnaire (IBPLOQ) and the Learning Outcome Assessment Tool (LOAT). The IBPLOQ was a 35-item questionnaire designed to elicit information from respondents. The instruments consisted of three sections: A and B. Section A elicited participants demographic data while, section B is a 35-item 4point Likert scale questionnaire divided in two sets of questions on IBPLOQ and LOAT with options of Strongly Agree, (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instruments were face validated by three experts from the Educational Technology Departments, one from Unicross and two from Unical.

A reliability test was conducted using 20 students that were not part of the actual study. The Cronbach alpha coefficient was used to determine the internal consistency of the IBPLOQ and

LOAT. The result showed a reliability coefficient of 0.85 and 0.79 respectively indicating that the instrument was reliable for measuring the variables under study. The researchers, with the assistance of two trained research assistants, administered the questionnaires to the students in their respective classrooms. The students were assured of the confidentiality and anonymity of their responses. The questionnaires were completed and returned on the spot to avoid mortality. The administration of the instruments took approximately two weeks to complete. The data collected were analyzed using the Pearson product moment correlation analysis to test the hypotheses at a 0.05 level of significance. The analysis was used to determine the relationship between interactive boards cum projectors and learning outcomes among students

Results and Discussion

Hypotheses 1: There is no significant relationship between the use of interactive boards and projectors and students' interest in learning in public universities in Cross River State. The result of the analysis is shown in Table 1.

Table 1: Pearson Product Moment Correlation (PPMC) of relationship between the use of interactive boards and projectors and students' interest in learning in public universities in Cross River State (N=346)

Variables	$\bar{x}$	SD	r-ratio	Df	p-level
interactive boards cum projectors (X)	13.996	3.411	.215*	344	.000
Students' interest (y)	25.443	3.371			

*Significant at .05 level; p<.05.

The result in Table 1 indicated that interactive boards and projectors had a mean score of 13.996 with a standard deviation of 3.411 while students' interest in learning in public universities in Cross River State had a mean score of 25.443 with standard deviation of 3.371. The outcome further showed that the re-calculated value of 0.215 is significant at .05. Also, the p<.000 is less than p<.05

meaning that the null hypothesis which expressed there is no significant relationship between the use of interactive boards and projectors and students' interest in learning in public universities in Cross River State was rejected, indicating that, there is a significant relationship between the use of interactive boards cum projectors and students' interest in public universities in Cross River State**.**

Hypotheses 2: There is no significant relationship between the use of interactive boards and projectors and students' retention in learning in public universities in Cross River State.

Table 2: Pearson Product Moment Correlation (PPMC) of relationship between the use of interactive boards and projectors and students' retention in learning in public universities in Cross River State (N=346)

Variables	$\bar{x}$	SD	r-ratio	Df	p-level
interactive boards cum projectors (X)	13.996	3.411	.316*	344	.000
Students' retention (y)	26.117	2.918			

*Significant at .05 level; p<.05.

The result as presented in Table 2 indicated that interactive boards and projectors had a mean score of 13.996 with a standard deviation of 3.411 while students' retention in learning in public universities in Cross River State had a mean score of 26.117 with standard deviation of 2.9181. The outcome further showed that the r-calculated value of 0.316 is significant at .05. Also, the p<.000 is less than p<.05 meaning that the null hypothesis which expressed there is no significant relationship between the use of interactive boards and projectors and students' retention in learning in public universities in Cross River State was rejected indicating that there is a significant relationship between the use of interactive boards and projectors and students' retention in learning in public universities in Cross River State

Hypotheses 3: There is no significant relationship between the use of interactive boards and projectors and students' performance in learning in public universities in Cross River State.

Table 3: Pearson Product Moment Correlation (PPMC) of relationship between the use of interactive boards and projectors and students' performance in learning in public universities in Cross River State (N=346)

Variables	$\bar{x}$	SD	r-ratio	Df	p-level	*
interactive boards cum projectors (X)	13.996	3.411	.142*	344	.002	
Students' performance (y)	22.341	3.816				

Significant at .05 level, p≤0.5

The result in Table 3 revealed that interactive boards and projectors had a mean score of 13.996 with a standard deviation of 3.411 while students' performance in learning in public universities in Cross River State had a mean score of 23.341 with standard deviation of 3.816. The outcome further showed that the r-calculated value of 0.142 is significant at .05. Also, the p<.002 is less than p<.05 meaning that the null hypothesis which expressed there is no significant relationship between the use of interactive boards and projectors and students' performance in learning in public universities in Cross River State was rejected indicating that there is a significant relationship between the use of interactive boards and projectors and students' performance in public universities in Cross River State

Discussion of findings

Data in Table 1 showed that there that the null hypothesis was dropped. This implies that that there is a significant relationship between the use of interactive boards and projectors and students' interest in learning in public universities in Cross River State. The finding of this study is in consonance with the findings of Huang et al. (2022; Nkanu et al. 2021) that stated that student interest in learning is a critical factor in the educational process, as it can significantly impact students' motivation and engagement in learning. According to the authors, student interest refers to the level of enthusiasm and motivation students have towards learning with interactive boards cum projectors. Research has shown that interactive technologies, such as interactive whiteboards, can

increase student interest and engagement in learning (Huang et al., 2022). Additionally, a study by Özçınar (2016) and Imoke, et al. (2021) found that the use of interactive whiteboards can lead to increased student motivation and interest in learning. By examining the impact of interactive boards cum projectors on student interest, this study aims to contribute to the existing body of research on the effectiveness of interactive technologies in education.

Data in Table 2 equally showed there that the null hypothesis was dropped implying that there is a significant relationship between the use of interactive boards cum projectors and students' retention in public universities in Cross River State. This result confirms the statement of Okoye (2018) Asogwa, et al. (2022) who refers to retention as the process of maintaining the availability of new meanings or some part of them. According to the author learning, need to be presented to the learners in a way or method that touches their sub-consciousness, which can trigger quick recalling of the concepts, processes and skills being taught and learnt. Learning experiences in which the contents and materials are presented in a form that appeal to multiple human senses simultaneously and to encourage active involvement of students in leaning activities have been associated with longer retention. This is in line with the findings of Okoye (2018) and Imoke, et al. (2024) who stated that active participation during instruction increases learning and retention. In predicting academic achievement and retention some scholars and researchers view gender as a relevant factor to be reckoned with while others believe that gender is not a relevant factor.

Data in Table 3 showed there that the null hypothesis was dropped. This implies that that there is a significant relationship between the use of interactive boards and projectors and students' performance in public universities in Cross River State. The finding of this study is in consonance findings of Nwafor, et al. (2024) and Huang, et al. (2022) who found that the use of interactive technologies in the classroom can enhance student engagement, motivation, and academic achievement. According to the authors by measuring student outcomes, educators can assess the effectiveness of their instructional methods and make data-driven decisions to improve teaching and learning.

Conclusion

Based on the findings of this study, it can be concluded that the use of interactive boards cum projectors has a significant positive impact on students' interest, retention, and performance in public universities in Cross River State. The results of the study revealed a significant relationship between the use of interactive boards cum projectors and students' interest, retention, and performance, indicating that the use of these technologies can enhance students' learning outcomes. The findings of this study suggest that the integration of interactive boards cum projectors into the teaching and learning process can increase students' motivation and engagement, improve their ability to retain information, and ultimately lead to better academic performance. Therefore, it is recommended that public universities in Cross River State and other similar institutions consider incorporating interactive boards cum projectors into their teaching and learning processes to enhance students' learning outcomes. Generally, this study provides evidence of the potential benefits of using interactive boards cum projectors in educational settings and highlights the need for further research into the effective integration of these technologies into the teaching and learning process.

Recommendations

Based on the findings of the study, the following recommendations were given by the researcher

1. The management of public universities in Cross River State should invest in the procurement, installation, and maintenance of already existing interactive boards and projectors in all classrooms and lecture halls to enhance students' interest in learning.
2. Lecturers and instructors in public universities in Cross River State should be trained and encouraged to integrate interactive boards and projectors into their teaching methods to improve students' retention of learned materials.
3. The government and other stakeholders in the education sector should provide support and resources for the effective integration of interactive boards and projectors into the teaching and learning process in public universities in Cross River State, with a view to improving students' academic performance.

References

Asogwa, U. D., Nkanu, C. U. & Saboc, A. (2022). Assessment of e-learning readiness of lecturers and students in federal colleges of education in North-East, Nigeria. *International Journal of Curriculum and Instruction, 14*(1). 455-472.

Bao, M. (2022). Exploring the impact of technology-mediated instruction on student engagement and learning outcomes. *Journal of Educational Technology Development and Exchange*, 14(1), 1-20.

Beeland, W. D. (2002). Student engagement, visual learning, and technology: Can interactive whiteboards help? *Action Research Exchange, 1*(1), 1-19.

Biehler, R. F. & Snowman, J. (1993). *Psychology applied to teaching (7th Ed.).* Boston:

Bradley, T., & Lomicka, L. (2017). A Case Study of Learner Interaction in Technology-EnhancedLanguage Learning Environments. *Journal of Educational Computing Research*, 22 (3): 347-368

Cakir, F. N. (2017). The effects of interactive whiteboard use on student achievement in mathematics. *Journal of Educational Technology Development and Exchange, 10*(1), 1-15.

Federal Ministry of Education. (2013). *National policy on education*. Abuja: Federal Ministry of Education.

Gulsecen, S., & Dalveren, I. (2016). The effects of interactive whiteboard use on student engagement. *Journal of Educational Technology, 13*(2), 1-12.

Hennessy, S., Mercer, N., & Warwick, P. (2014). A dialogic inquiry approach to working with teachers in developing classroom dialogue, *Teachers College Record, 113*(9), 1906-1959.

Hsu, T. C., Ching, Y. H., & Tsai, C. C. (2013). The effects of interactive whiteboard use on student motivation. *Journal of Educational Multimedia and Hypermedia, 22*(1/2), 5-20.

Huang, R., Liu, D., & Zhang, J. (2022). Exploring the impact of interactive technology on student engagement and academic achievement. *Journal of Educational Computing Research, 60*(4), 419-435.

Imoke, J. E., Nkanu, C. U. & Bisong, A. E. (2021a). Social media as teaching/learning tools in Nigerian tertiary institutions: Contributory driver to 21st century inclusive education efforts. *International Journal for Innovation Education and Research, 7*(9), 372-386.

Imoke, J. E., Nkanu, C. U., Bisong, A. E., Offiong, A. E. A & Imoke, M. J. (2021b). Integration of game-based instruction into teaching-learning processes in tertiary institutions: significance to 21st century Education. *International Journal of Innovation and Research in Educational Sciences, 8*(5). 342-350.

Imoke, J. E., Ushie, B. C. & Ofem, I. B. (2024). Interactive/Smart Whiteboard and Student-Teachers Academic Performance in Educational Technology at the University of Calabar,

Nigeria. *European Journal of Contemporary Education and E-Learning, 2*(1), 170-176. https://doi.org/10.59324/ejceel.2024.2(1).14

Imoke, J. E., Nkanu, C. U., Bisong, A. E., Akpo, F. A. & Imoke, M. J. (2023). Lecturers' variables and utilization of web-based resources in state colleges of education in South-South Nigeria. *Journal of Education and Practice, 14*(8). 18-24. DOI: 10.7176/JEP/14-8-04

Johnson, I. E., Nkanu, C. U. & Udo, A. L. (2021). Checkmating the Weaknesses Associated with Information and Communication Technologies in Education for Improved Effectiveness and Efficiency. *Journal of Education and Practice, 12*(8). 80-85. DOI: 10.7176/JEP/12-8-11.

Kennewell, S. (2018). *Researching the Influence of Interactive Presentation Tools on Teacher Pedagogy*. Paper presented at the British Educational Research Association Annual Conference, Manchester, UK.

Kennewell, S., & Beauchamp, G. (2017). The features of interactive whiteboards and their influence on learning. *Learning, Media and Technology, 32*(3), 227-241. doi: 10.1080/17439880701511073

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Nkanu, C. U., Imoke, J. E. & Bisong, A. E. (2023). Integrating telegram messenger application for effective instructional content delivery in post COVID-19 era. *SIASAT Journal of Social, Cultural and Political Studies, 8*(2), 103-110. https://doi.org/10.33258/siasat.v8i2.150

Nwafor, P. I., Ekpoto, D. F., Akpama, V. S. & Ekpoto, R. D. (2024). Learning resources availability and students' academic performance in social studies in Calabar municipal council, Cross River State, Nigeria: Implication for Geography education. *International Journal of Arts, Languages and Business Studies (IJALBS), 13*; 79-85.

Okoye, A. C. (2018*). Effects of Computer Assisted Instruction on Students' Acquisition of Science Process skills, retention and Interest in Biology*. Unpublished PhD thesis Nsukka: University of Nigeria

Özçınar, H. (2016). The effect of interactive whiteboard on student motivation. J*ournal of Educational Technology Development and Exchange, 9(*1), 1-18.

Ran, K., Greenwood, J., Fox-Turnbull, W. & Wise, S. (2018). A shift from traditional pedagogy in Nepali Rural Primary Schools? Rural teachers' capacity to reflect ICT policy in their practice. *International Journal of Education and Development using Information and Communication Technology* (IJEDICT), 14(3):149-166.

Tsayang, G., Batane, T. & Majuta, A. (2020). The impact of interactive Smart boards on students' learning in secondary schools in Botswana: A students' perspective. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 16(2):22-39.

Ulonnam, S. C., Nkanu, C. U., Imoke, J. E. & Edet, P. E. (2024). Audio Compact Disc and Audio-Visual Podcast Instructional Resources and Students' Achievement in English Listening Comprehension. *Electronic Research Journal of Social Sciences and Humanities, 6*(IV), 46-54.