Information and Communication Technology Use as Determinants of Senior Secondary School Students' Attitudes towards Learning in Southwest Nigeria

[1] Dolapo Omotayo RAJI
rajidolapo@yahoo.com
National Institute for Educational Planning & Administration (NIEPA), Ondo, Nigeria
&
[2]Afolakemi Olasumbo OREDEIN
opefolake1@yahoo.com; a.oredein@lcu.edu.ng
Lead City University, Ibadan, Oyo State, Nigeria

Abstract
Attitude toward learning remains a critical factor influencing students' academic progress, yet concerns persist regarding the disengagement of senior secondary school students in Southwest Nigeria. Many learners struggle with low participation, irregular class attendance, and declining enthusiasm, raising questions about the drivers of these trends. Given the increasing role of technology in education, this study examined how Information and Communication Technology (ICT) use predicts students' attitudes toward learning in public senior secondary schools in the region. A descriptive survey design was employed, targeting a population of 208,804 students across 2,262 schools. Using a multi-stage sampling procedure, 1,187 Senior Secondary School Two (SS2) students were selected as participants. Data were collected with a self-constructed instrument, the Senior Secondary School Students' Attitudes toward Learning Questionnaire (SSSSALQ), which demonstrated reliability ($\alpha = 0.789$). Findings indicated that student attitudes toward learning was low ($\bar{x} = 2.4$); ICT use was also low ($\bar{x} = 2.19$); Regression results showed that ICT use significantly influenced students' attitudes toward learning ($\beta = 0.762$, $t = 39.367$, $p < 0.05$). The study concluded that enhancing ICT competence and integration within schools is essential to improving students' engagement, attendance, and motivation. It was therefore recommended among others that schools should adopt student-centered teaching methods that encourage participation, improve attendance, and sustain enthusiasm for learning.
Keywords: ICT Use, Attitudes towards Learning, Senior Secondary School Students
Word Count: 214

Introduction

Learning remains an indispensable driver of students' cognitive, social, and emotional development, shaping both their immediate academic performance and long-term life opportunities. It is a multifaceted process through which individuals acquire, internalize, and apply knowledge, skills, and values in diverse contexts (Warsah et al., 2021). Effective learning requires not only the

transmission of information but also the cultivation of students' motivation, engagement, and positive dispositions towards education. However, researchers have reported worrying trends where students initially exhibit attitude towards learning. For example, in Nigeria, students' attitudes towards learning often present challenges that hinder academic growth. For instance, many primary school pupils develop a negative outlook towards mathematics, showing low motivation, fear of failure, and a lack of confidence, which ultimately leads to poor performance in the subject (Suleiman et al., 2020). Similarly, in secondary schools, resistance to learning Standard English is common as students prefer to use Pidgin English or their mother tongue, and this weakens their ability to gain the proficiency needed for academic and professional success (Ereke & Agwu, 2015).

Attitudes towards other subjects also reveal worrying trends. Physical Education, for example, is often dismissed as a subject with little academic value, leading students to approach it with disinterest and a lack of seriousness, despite its importance for science, health, and overall development (Orunaboka, 2011). In the sciences, gender disparities play a significant role: female students in states like Cross River tend to show more negative attitudes towards science subjects compared to their male counterparts, which reflects broader cultural and motivational barriers that discourage girls from engaging fully with STEM fields (David et al., 2013). Altogether, these instances reflect a pattern of poor student attitudes in Nigeria, rooted in subject-specific fears, resistance to language norms, gender-related barriers, and lack of inclusivity, that continues to limit both academic performance and future career opportunities. This study, therefore, places emphasis on class participation, class attendance, and enthusiasm as the key indices of students' attitude toward learning in Southwest Nigeria.

Class participation refers to the degree to which students actively engage in learning activities through asking and answering questions, contributing to discussions, and interacting with peers during lessons. It is widely regarded as a behavioral manifestation of students' learning attitudes. Bond & Bedenlier (2019) highlight that active participation enhances deep learning, collaboration, and academic performance, especially in environments designed to promote student interaction. Class attendance on the other hand reflects students' consistency and punctuality in attending scheduled classes, whether face-to-face or online. It is a reliable indicator of commitment to academic work, as Credé et al., (2010), have shown that regular attendance is positively associated with academic achievement, particularly for students with initially lower performance levels. Thus, attendance is not only a marker of discipline but also a strong predictor of overall learning outcomes. Also, enthusiasm

is the affective dimension of students' attitude toward learning and represents the energy, motivation, and positive emotions they bring into academic activities. Students who demonstrate enthusiasm often show greater persistence, curiosity, and willingness to go beyond minimal requirements.

One of the factors that critically influences attitudes toward learning among secondary school students in Nigeria is information and communication technology use. However, much attention seems not to be given to the role of information and communication technology use as a significant determinant of attitudes toward learning in Southwest, Nigeria. In line with this, the study investigates information and communication technology use as determinant of senior secondary school students' attitudes toward learning in Southwest Nigeria.

Information and Communication Technology (ICT) has become the lifeblood of our interconnected world, permeating every sector and aspect of our lives (Ashari et al., 2014). ICT use has profoundly reshaped education, ushering in a new era of dynamic and personalised learning. Students now have access to a wealth of digital resources, from e-books to interactive simulations that cater to diverse learning styles. ICT's transformative power extends beyond the classroom, enabling remote learning through online platforms and video conferencing tools. It connects students globally, fostering cross-cultural understanding while also equipping them with essential digital literacy skills. The widespread use of ICT in education positively influences students' attitudes towards learning by providing interactive and engaging learning experiences and fostering curiosity and self-directed learning (Al-Rahmi et al., 2020). This study focuses on mastery experience, vicarious experience, and cybersecurity awareness and practices as indices to measure ICT use.

Yeh et al., (2019) describe mastery experience as skill acquisition and growth through direct achievement and practice, fostering self-efficacy and a growth mindset. In education, it strengthens students' confidence in using digital tools by enabling them to overcome challenges and succeed with technology. Vicarious experience involves learning through observation or indirect experiences, such as watching peers, teachers, or simulations (Klofutar et al., 2022). It enriches students' engagement and motivation by making learning more relevant and immersive. Cybersecurity awareness and practices on the other hand, cover knowledge of digital threats and proactive strategies to protect systems and data (Alotaibi et al., 2023). By highlighting real-world applications, these practices build critical thinking, problem-solving skills, and responsibility, which extend beyond technology to broader learning contexts. This study therefore investigates ICT use as determinant of senior secondary school students' attitudes towards learning in Southwest Nigeria.

Statement of the Problem

In Southwest Nigeria, there is growing alarm among educational stakeholders over the diminishing enthusiasm of senior secondary school students toward learning. Observations indicate that many students demonstrate low motivation, hesitance in class participation, frequent absenteeism, and overall disengagement from academic pursuits. Contributing factors identified in various studies include obsolete teaching methods, limited classroom and digital resources, infrastructural hurdles, inadequate training for teachers, and socio-economic constraints (Awodun, 2024; Ndarake et al., 2024). Despite the widespread global adoption of ICT as a pedagogical enhancer, boosting student engagement, fostering interactive learning, and improving attitudes toward education, its integration in many public senior secondary schools in Southwest Nigeria remains insufficient. Challenges such as unreliable electricity, poor internet access, high costs of digital tools, and low digital literacy among educators and learners undermine effective ICT utilization (Awodun, 2024; Ndarake et al., 2024). If this imbalance persists, the consequences may be severe: chronic underachievement, higher dropout rates, limited readiness for tertiary education, reduced future employability in an evolving digital economy, and broader socio-economic setbacks. While prior research has examined aspects like educational technology availability and general student attitudes, there remains a noticeable gap in understanding how actual ICT use directly influences senior secondary students' attitudes toward learning in Southwest Nigeria. Consequently, this study aims to fill that void by exploring ICT usage as a determinant of students' learning attitudes in Southwest Nigeria.

Aim and Objectives of the Study

The aim of the study is to investigate ICT use as determinant of senior secondary school students' attitudes towards learning in Southwest Nigeria. The objectives of the study are to:

i. determine the level of public senior secondary school students' attitudes towards learning (class participation, class attendance, enthusiasm) in southwest Nigeria.
ii. ascertain the level of Information and Communication Technology use (mastery experience, vicarious experience and cybersecurity awareness and practices) in public senior secondary schools in Southwest Nigeria.

iii. examine the influence of Information and Communication Technology use on public senior secondary school students' attitudes towards learning in secondary schools in southwest Nigeria.

Research Questions

1. What is the level of public senior secondary school students' attitudes towards learning (class participation, class attendance, enthusiasm) in southwest Nigeria?
2. What is the level of Information and Communication Technology use (mastery experience, vicarious experience and cybersecurity awareness and practices) in public senior secondary schools in Southwest Nigeria?

Hypothesis

$H_0$1: There will be no significant influence of Information and Communication Technology use on public senior secondary school students' attitudes towards learning in secondary schools in southwest Nigeria.

Methodology

This study adopted a descriptive survey research design, which enabled the collection of data from a representative sample without manipulating any variables. The population consisted of all students enrolled in public senior secondary schools in Southwest Nigeria, where a total of 208,804 students were spread across 2,262 public secondary schools at the time of the study (Federal Ministry of Education, 2024). A multi-stage sampling procedure was employed. First, Southwest Nigeria was grouped into three geographical clusters: Ogun–Lagos, Ondo–Ekiti, and Oyo–Osun. One state was randomly selected from each cluster, resulting in Ogun, Ondo, and Oyo states. Each selected state comprises three senatorial districts. In the next stage, schools were selected from each district based on two criteria: they must have existed for at least forty years and must have a minimum of 100 SS2 students. These criteria ensured the inclusion of well-established schools with adequate student populations capable of providing reliable data. The Taro Yamane formula ($n = N / [1 + N(e)^2]$), with a 0.05 margin of error, was used to determine the sample size. Students and teachers were then selected using simple random sampling, resulting in a final sample of 599 schools and 1,187 students.

Data were gathered using a self-constructed four-point Likert scale instrument titled *Senior Secondary School Students' Attitudes towards Learning Questionnaire (SSSSALQ)*. The questionnaire comprised four sections (A–D). Section A captured demographic information such as gender, age range, and class size. Section B contained 15 items assessing students' attitudes towards learning in terms of class participation, attendance, and enthusiasm. Section C featured 15 items measuring ICT use in secondary schools, focusing on mastery experience, vicarious experience, and cybersecurity awareness. Section D consisted of 5 items examining the influence of ICT use on students' attitudes towards learning. Reliability was established using the Cronbach's Alpha method, yielding a coefficient of $\alpha = 0.789$, which indicated an acceptable level of internal consistency.

Ethical standards governing data collection, processing, and reporting as stipulated by Lead City University were observed throughout the study. Data were analysed using descriptive and inferential statistical techniques. Descriptive statistics such as frequency counts, simple percentages, and mean scores were used to answer the research questions, while simple regression analysis was employed to test the hypothesis at the 0.05 significance level.

Results

Presentation of Demographic Data

Table 1: Demographic Data of Respondents

Gender	**Frequency**	**Percentage**
Male	582	57.0
Female	439	43.0
Total	**1021**	**100**
Age Range		
Less than 15 Years	466	45.6
15-17 Years	504	49.4
Above 17 Years	51	5.0
Total	**1021**	**100**
Class Size		
Less than 30	232	22.7
31-50	452	44.3

51-70	198	19.4
Above 71	139	13.6
Total	**1021**	**100**

Source: Researcher's Field Survey, 2024

Table 1 showed the demographic characteristics of the respondents. The findings revealed that 582 participants (57.0%) were male, whereas 439 (43.0%) were female. With respect to age distribution, 466 respondents (45.6%) were below 15 years, 504 (49.4%) were between 15 and 17 years, and 51 (5.0%) were above 17 years. Considering class size, 232 respondents (22.7%) were in classes with fewer than 30 students, 452 (44.3%) were in classes with 31–50 students, 198 (19.4%) were in classes with 51–70 students, and 139 (13.6%) were in classes with more than 71 students. Altogether, the total number of respondents across all demographic categories was 1,021.

Presentation of Answers to Research Questions

Research Question One: What is the level of public senior secondary school students' attitudes towards learning (class participation, class attendance, enthusiasm) in southwest Nigeria?

Table 2: Public Senior Secondary School Students' Attitudes towards Learning (Class Participation, Class Attendance, and Enthusiasm) in Southwest Nigeria

Items	**AL**	**S**	**R**	**N**	**Weighted Mean**
Class Participation	170(16.7%)	169(16.6%)	373(36.5%)	309(30.2%)	2.19
Class Attendanc	268(26.3%)	241(23.6%)	181(17.7%)	331(32.4%)	2.44
Enthusiasm	299(29.3%)	257(25.2%)	195(19.1%)	270(26.4%)	2.57
Overall Weighted Mean= 2.4 Low					

Source: Researcher's Field Survey, 2024

KEY: AL= Always (4), S= Sometimes (3), R= Rarely (2), N= Never (1)

Threshold: Mean value of ≥ 3.00 (High), 2.5-2.99 (Moderate) and ≤ 2.50 (Low)

The results in Table 2 showed the attitudes of public senior secondary school students towards learning in Southwest Nigeria, assessed through class participation, class attendance, and enthusiasm. For class participation, 170 students (16.7%) always participated, 169 (16.6%) participated sometimes, 373 (36.5%) rarely participated, while 309 (30.2%) never participated, resulting in a weighted mean of 2.19, which was considered low. In terms of class attendance, 268 students (26.3%) always attended, 241 (23.6%) attended sometimes, 181 (17.7%) rarely attended, and 331 (32.4%) never attended, giving a weighted mean of 2.44, also classified as low. Regarding enthusiasm, 299 students (29.3%) were always enthusiastic, 257 (25.2%) were sometimes enthusiastic, 195 (19.1%) were rarely enthusiastic, while 270 (26.4%) were never enthusiastic, with a weighted mean of 2.57, which indicated a moderate level. Overall, the students' attitudes towards learning had a weighted mean score of 2.4, which fell within the low category, suggesting that public senior secondary school students in Southwest Nigeria generally exhibited low levels of positive attitude towards learning.

Research Question Two: What is the level of Information and Communication Technology use (mastery experience, vicarious experience and cybersecurity awareness and practices) in public senior secondary schools in Southwest Nigeria?

Table 3: Level of Information and Communication Technology Use (Mastery Experience, Vicarious Experience and Cybersecurity Awareness and Practices) in Public Senior Secondary Schools in Southwest Nigeria

Items	AL	S	R	N	Weighted Mean
Mastery Experienc	122(11.9%)	175(17.1%)	267(26.2%)	457(44.8%)	1.96
Vicarious Experience	171(16.7%)	248(24.3%)	268(26.2%)	334(32.7%)	2.25
Cybersecurity Awareness ar Practices	148(14.5%)	302(29.6%)	345(33.8%)	226(22.1%)	2.36
Overall Weighted Mean= 2.19 Low					

Source: Researcher's Field Survey, 2024

KEY: AL= Always (4), S= Sometimes (3), R= Rarely (2), N= Never (1)

Threshold: Mean value of ≥ 3.00 (High), 2.5-2.99 (Moderate) and ≤ 2.50 (Low)

Table 3 presented the overall level of ICT use among public senior secondary school students in Southwest Nigeria, focusing on three dimensions: mastery experience, vicarious experience, and cybersecurity awareness and practices. The weighted mean score for mastery experience is 1.96, indicating a low level of competence among students in using ICT tools. This suggests that most students struggle with confidence and proficiency in applying ICT skills to their academic work and daily tasks. The vicarious experience weighted mean is 2.25, also categorized as low. This means that students are not significantly influenced by observing or learning from their peers' success in using ICT, indicating limited peer-to-peer learning in technology use. For cybersecurity awareness and practices, the weighted mean is 2.36, which remains in the low category. While students have some understanding of cybersecurity threats and engage in limited protective practices, their overall awareness and implementation of online safety measures are insufficient. The overall weighted mean score across all areas is 2.19, placing the general level of ICT use among students in the low category. This highlights the need for substantial improvement in ICT education and support, particularly in enhancing students' confidence, skills, peer learning, and cybersecurity awareness.

Test of Hypothesis

$H_0$1: There will be no significant influence of Information and Communication Technology use on public senior secondary school students' attitudes towards learning in secondary schools in southwest Nigeria.

Table 4: Summary of Regression Analysis showing Influence of Information and Communication Technology Use on Public Senior Secondary School Students' Attitudes towards Learning in Secondary Schools in Southwest Nigeria

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.023	.554		1.846	.065
	ICT Use	.848	.022	.762	39.367	.000

a. Dependent Variable: Attitude towards Learning

Source: Researcher's Field Survey, 2024

Table 4 presented the summary of the regression analysis showing the influence of Information and Communication Technology (ICT) use on public senior secondary school students' attitudes towards learning in Southwest Nigeria. The result revealed that ICT use had a significant positive influence on students' attitudes towards learning ($\beta = 0.762$, $t = 39.367$, $p < 0.05$). The unstandardized coefficient ($B = 0.848$, $SE = 0.022$) indicated that for every one-unit increase in ICT use, students' attitudes towards learning increased by 0.848 units. The constant value of 1.023 suggested that even without ICT use, students still demonstrated a baseline level of positive attitude towards learning. However, the p-value (.065) for the constant showed that it was not statistically significant.

Discussion of Findings

Research question one focused on determining the extent of public senior secondary school students' attitudes toward learning, specifically in the areas of class participation, class attendance, and enthusiasm in Southwest Nigeria. The results showed that students demonstrated low levels in all three aspects. These poor outcomes in participation, attendance, and enthusiasm may be attributed to several factors. Socio-economic difficulties, such as financial constraints, often compel students to prioritize income-generating activities over schooling, resulting in irregular attendance. Several studies support these findings. For example, Olasen & Lawal (2020) showed that overcrowded clas srooms hinder student engagement and performance, particularly in subjects like mathematics. The COVID-19 pandemic has also played a role, with a study noting that disruptions in the academic calendar have caused further drops in student attendance and participation (Oyinloye, 2020). Ayo-Oladapo et al., (2023) emphasized that poor classroom management is a significant factor contributing to low student engagement, showing how disorder in class reduces learning outcomes and participation. However, other research challenges these findings. For instance, Mulei et al., (2020) showed that despite low enthusiasm for certain career paths, students still actively engage in agricultural education, recognizing its potential value. Similarly, Odo (2022) indicated that interactive online learning methods can significantly increase student participation, showing that proper learning environments can motivate students. Finally, Imam (2020) argued that the lack of effective participation structures, rather than student disinterest, is the key issue in Nigerian schools, suggesting that better involvement practices could foster greater enthusiasm and attendance.

Research question two aimed at determining the level of Information and Communication Technology use (mastery experience, vicarious experience, and cybersecurity awareness and practices) in public senior secondary schools in Southwest Nigeria. The analysis revealed that the level of ICT use among public senior secondary school students in Southwest Nigeria is low. The low level of ICT use can be attributed to several factors, including limited access to ICT infrastructure, such as computers and reliable internet, which restricts students' ability to engage with technology. Also, some teachers are often unable to effectively integrate ICT into lessons. Insufficient government funding exacerbates these challenges by failing to prioritise investment in technology resources or professional development. Studies highlight a concerning trend regarding the use of Information and Communication Technology (ICT) among public senior secondary school students in Southwest Nigeria, revealing that their engagement with technology is alarmingly low. For instance, Amina, (2019) revealed a significant disparity in the availability and utilisation of ICT resources, noting that public secondary schools in Abuja lag behind private institutions. This gap points to a broader issue of limited access to essential technological tools. Similarly, Garba et al., (2022) indicated that students in northeastern Nigeria possess only a moderate awareness of cybersecurity, further suggesting that the integration of ICT into their education is insufficient and that they lack essential knowledge of safe online practices. In contrast, some studies present a more optimistic picture, suggesting that with the right support and training, ICT integration can be enhanced. For example, Mtebe (2020) found that instructors in Tanzania benefitted from vicarious experiences and organisational support, which significantly improved their self-efficacy regarding ICT use. Similarly, it was reported that teachers across several Sub-Saharan African countries, including Nigeria, expressed satisfaction with ICT training programs and actively incorporated technology into their classrooms, despite facing challenges (Agyei, 2021).

Hypothesis one aimed at examining the influence of Information and Communication Technology use on senior secondary school students' attitudes towards learning in public senior secondary schools in Southwest Nigeria. The findings revealed that ICT use significantly influence students' attitudes towards learning. This finding is consistent with several findings. For instance, Seitan et al., (2020) demonstrated that integrating ICT through flipped learning led to improved academic achievement and positive attitudes among secondary school students, highlighting the importance of technology in enhancing learning outcomes. Balasubramanian & Govindarajan (2020) also found that secondary school teachers with positive attitudes and competency in ICT use

contributed to better student outcomes, emphasising the importance of integrating technology in the learning environment. Again, Njati & Kimani (2023) concluded that ICT promotes student-centred learning, cooperative learning, and higher-order thinking in secondary schools, reinforcing the critical role ICT plays in improving learning experiences. There are some studies opposing these findings. For instance, Petraşuc & Popescul (2019) highlighted the negative effects of over-reliance on ICT, such as reduced cognitive capacity and attention span, arguing that ICT can sometimes hinder learning and lead to superficial engagement. Some scholars also observed that while ICT improved administrative efficiency, it had limited direct impact on academic learning in secondary schools, showing that technology might not always translate to better academic outcomes (Chika & Wale, 2020). Omwoki et al., (2023) also found that despite the availability of ICT tools, teachers' lack of training and negative attitudes hindered their effective integration in teaching, resulting in minimal improvements in student outcomes.

Conclusion

This study investigated Information and Communication Technology (ICT) use as a determinant of senior secondary school students' attitudes toward learning in Southwest Nigeria. The findings revealed that students generally exhibited low levels of positive attitudes toward learning, particularly in class participation, attendance, and enthusiasm. Similarly, ICT use among students was found to be low across mastery experience, vicarious experience, and cybersecurity awareness and practices. Despite these low levels, the regression analysis demonstrated that ICT use had a significant positive influence on students' attitudes toward learning. This suggests that effective and sustained integration of ICT in the teaching and learning process can foster greater engagement, improve attendance, and enhance enthusiasm among students. Overall, the study concludes that ICT use is a vital driver of improved learning attitudes in senior secondary schools in Southwest Nigeria.

Recommendations

1. School managements should adopt student-centered teaching methods that encourage participation, improve attendance, and sustain enthusiasm for learning.
2. Government and school authorities should provide adequate ICT infrastructure, and organize regular ICT training workshops for both teachers and students to improve competence, peer learning, and awareness of safe technology use.

3. Teachers should deliberately integrate ICT into lesson delivery, through multimedia presentations, simulations, and online collaborative platforms to enhance students' engagement, attendance, and enthusiasm, thereby leveraging ICT as a catalyst for positive learning attitudes.

References

Agyei, D. D. (2021). Integrating ICT into schools in Sub-Saharan Africa: From teachers' capacity building to classroom implementation. *Education and Information Technologies*, *26*(1), 125-144.

Alotaibi, S., Furnell, S., & He, Y. (2023). Towards a framework for the personalization of cybersecurity awareness. In *International Symposium on Human Aspects of Information Security and Assurance* (pp. 143-153). Cham: Springer Nature Switzerland.

Al-Rahmi, W. M., Alzahrani, A. I., Yahaya, N., Alalwan, N., & Kamin, Y. B. (2020). Digital communication: Information and communication technology (ICT) usage for education sustainability. *Sustainability*, *12*(12), 1-18.

Amina, O. M. (2019). Assessment of the availability and utilization of information communication technology (ICT) resources in public and private secondary schools in Abuja Nigeria, *International Journal of Scientific and Research Publications (IJSRP),* 9(2), 100-108.

Ashari, H. A., Heidari, M., & Parvaresh, S. (2014). Improving SMTEs' business performance through strategic use of information communication technology: ICT and tourism challenges and opportunities. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *4*(3), 1-20.

Awodun, M. A. (2024). Influence of Information Communication and Technology in Teaching of Senior Secondary School Students in Ekiti State, Nigeria. *Bisawo - International Journal of Education and Social Sciences (BIJESS)*, 5(1), 7-12.

Ayo-Oladapo, E. O., Abu, I. O., & Ifejuowo, M. I. (2023). Classroom management; a determinant of effective teaching and learning of languages in secondary schools in Ondo State, Nigeria. *Edumania–An International Multidisciplinary Journal*, *1*(03), 217-231.

Balasubramanian, T., & Govindarajan, K. (2020). Influence of attitude and competency towards ICT on job satisfaction of secondary school teachers. *Journal of Natural Remedies*, *21*(4), 13-19.

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: towards a conceptual framework. *Journal of Interactive Media in Education*, *2019*(1), 1-14.

Chika, N., & Wale, R. (2020). Influence of information and communication technology in secondary school administration in Abia State. *GSC Advanced Research and Reviews*, *3*(1), 026-035.

Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research*, *80*(2), 272-295.

David, O. E., Okorn, O., Koko, E., & Bessong, F. (2013). Attitude of science students towards science teaching in Cross River state, Nigeria. *Journal of Education and Practice*, *4*(5), 131-134.

Ereke, J. S., & Agwu, S. N. (2015). Language attitudes: effect of teaching English language in Nigerian secondary schools, *International Journal of English and Education*, 4(2), 180-189.

FME 2024. Federal Ministry of Education, Nigeria, Population of Public Secondary Schools and Students in Southwest Nigeria.

Garba, A. A., Siraj, M. M., & Othman, S. H. (2022). An assessment of cybersecurity awareness level among Northeastern University students in Nigeria. *International Journal of Electrical and Computer Engineering (IJECE)*, *12*(1), 572-584.

Imam, H. (2020). Investigating How Teachers and Students of Secondary Schools in Nigeria Describe and Understand Participation in Their Educational Institution. *Italian Journal of Sociology of Education*, *12*(Italian Journal of Sociology of Education 12/1), 80-101.

Klofutar, Š., Jerman, J., & Torkar, G. (2022). Direct versus vicarious experiences for developing children's skills of observation in early science education. *International Journal of Early Years Education*, *30*(4), 863-880.

Mtebe, J. S. (2020). Examining eLearning system self-efficacy amongst instructors at the University of Dodoma, Tanzania. *Open Praxis*, *12*(3), 343-357.

Mulei, W. M., Larinde, B., Adefioye, A., Bobo, P., & Woomer, P. L. (2020). Understanding the Perceptions of Secondary School Youth toward Agricultural Careers in Democratic Republic ofCongo, Kenya and Nigeria. *Journal of International Agricultural and Extension Education*, *27*(4), 62-78.

Ndarake, A. E., Bassey, A. E., Omolara, O. T., & Bessong, A. R. (2024). Nigerian senior secondary school students' engagements of digital technologies for learning. *International Journal of Innovative Technology Integration in Education*, *7*(1), 73-83.

Njati, I. C., & Kimani, J. W. (2023). Demystifying The use of information communication technology in teaching and learning in day secondary schools. *International Journal of Research and Innovation in Social Science*, *7*(5), 743-752.

Odo, M. (2022). Creating Interactive Online Learning Experiences among Secondary School Students in Lagos State, Nigeria. *Journal of Vocational Education Studies*, *5*(2), 276-287.

Olasen, V. M., & Lawal, D. D. (2020). Experimenting the effect of class size on mathematics based performance: A case study of selected public secondary school in Akure. *Higher Education of Social Science*, *18*(2), 26-30.

Omwoki, K. Omwenga, E. & Mamboleo, D. (2023). Assessment of the teachers' attitude towards ICT and learners' academic achievement in Geography in Nyamira County, Kenya. *Journal of Research Innovation and Implications in Education***.** 7(2), 210 – 222.

Orunaboka, T. T. (2011). Attitude of Nigeria secondary school students towards physical education as a predictor of achievement in the subject. *Journal of Education and Practice*, *2*(6), 71-77.

Oyinloye, O. M. (2020). Possible impact of COVID-19 on senior secondary school students' performance in science education in Nigeria. *Journal of Pedagogical Sociology and Psychology*, *2*(2), 80-85.

Petraşuc, A. M. G., & Popescul, D. (2019). The dark side of digitalization: Information and communication technology influence on human learning processes. In *The International Scientific Conference eLearning and Software for Education* (Vol. 2, pp. 116-123). " Carol I" National Defence University.

Seitan, W. I., Ajlouni, A. O., & Al-Shra'h, N. D. (2020). The impact of integrating flipped learning and information and communication technology on the secondary school students' academic achievement and their attitudes towards it. *International Education Studies*, *13*(2), 1-10.

Suleiman, F. D., Rameli, M. R. M., & Ado, M. (2020). Attitude of Nigerian primary school students toward mathematics subject. *Asia Proceedings of Social Sciences*, *6*(2), 174-177.

Warsah, I., Morganna, R., Uyun, M., Afandi, M., & Hamengkubuwono, H. (2021). The impact of collaborative learning on learners' critical thinking skills. *International Journal of Instruction*, *14*(2), 443-460.

Yeh, Y. C., Chang, H. L., & Chen, S. Y. (2019). Mindful learning: A mediator of mastery experience during digital creativity game-based learning among elementary school students. *Computers & Education*, *132*, 63-75.