

**FACTORS ASSOCIATED WITH INTEGRATING ELECTRONICS TEACHING  
AND LEARNING INTO SENIOR SECONDARY EDUCATION  
IN ILORIN METROPOLIS, KWARA STATE, NIGERIA**

**BY**

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**Abstract**

*The study investigated the factors associated with integrating electronics teaching and learning into senior secondary education in Ilorin metropolis, Kwara State. The study used a descriptive survey research method. The research focused on the whole population of senior secondary school teachers, specifically targeting those in three local government areas that comprise Ilorin. A total of 225 instructors from various topics in public senior secondary schools were randomly chosen from the senior secondary schools in Ilorin East, Ilorin South, and Ilorin-West local government areas. Data collection was conducted using a validated questionnaire designed by researchers, which had a reliability value of 0.79. The study prompted two research inquiries. The data gathered was analysed using descriptive statistics. The survey disclosed that the predominant electronic equipment used were computers and interactive whiteboards. The study revealed that the primary obstacles to the effective utilisation of electronic devices and platforms for education were the high cost of certain software, limited knowledge of information technology, difficulties in interpreting certain software, limited access to educational resources, expenses associated with internet access, unreliable internet connectivity, and inadequate electricity supply. It was recommended, among other, that instructors in senior secondary schools should not be discouraged by the difficulties associated with incorporating electronic teaching and learning into senior secondary education. Instead, they should persist in their attempts to encourage their students*

**Keywords:** *Technology-enhanced learning, E-teaching and learning, Integration, Senior secondary education, Secondary school teachers.*

**Introduction**

The Nigerian educational system has incorporated a new facet in teaching and learning at all levels. This is due to the increasing importance of electronic usage, which has become essential for both teaching and learning to align with the best instructional practices worldwide. It is well acknowledged that several poor countries have long embraced online education due to their recognition of its need and the extent of their progress. In recent years, Nigeria, a developing nation, has adopted electronics education due to requirement and rising global circumstances. The integration of electronics for instruction and learning into Nigerian education is considered an innovative endeavour, including all aspects of the process, methods, and platforms used for teaching and learning. Hence, electronic instruction and learning have been incorporated into education at all levels worldwide, signifying its enduring presence in the global education system (Haleem et al., 2022; Obidile, 2023; Sofi-Karim et al., 2023 & Oke et al., 2023)

Electronic teaching and learning are globally recognised under several terms, including online instruction, online teaching, online schooling, virtual learning, remote learning, and e-learning. The name chosen by each educational institution is based on the fundamental principle that teaching and learning are inseparable (UroKOVA, 2020; Torun, 2020). Teachers play a role in enabling learning by organising activities, while

learning occurs when students integrate new knowledge with what they already know (Sharin, 2021). The digital environment in which both teachers and students operate enables electronic teaching and learning. It is important to note that electronic teaching and learning, in the context of this study, does not exclusively refer to online learning and should not be used interchangeably. Instead, it can be understood as technology-enhanced learning, which is the main focus of this study. While secondary education is embracing educational tools and platforms, particularly in the realm of e-learning where internet and multimedia technologies play a fundamental role (Wu et al., 2020). Mokoena et al. (2022) identify various technological advancements in senior secondary education, such as computers, interactive whiteboards, projectors, and more.

In addition, senior secondary schools adopt a method of integrating educational tools with hands-on, classroom-based experiences in their approach to E-learning. The presence of computers or laptops in the classroom or computer section of the school enables students and teachers to conveniently access websites and utilise various applications, such as Microsoft Word, PowerPoint, PDF, as well as images (Turnbull et al., 2021; Nikolopoulou et al., 2020). Secondary schools with computer sections have incorporated the use of these applications to equip students for external examinations, which serve as a gateway to higher education (Bergdahl et al., 2020). Literature has established that, the use of information technology in the classroom does not significantly change classroom dynamics when compared to traditional tools like slide projectors, overhead transparency projectors, and blackboards (Stacy & Cain 2015; Hsia & Hwang (2021).

The identification of senior secondary school students who have been effectively exposed to technology-enhanced learning can be discerned by observing their calmness and attitudes during external assessments that gather students from various schools and locations, such as the Unified Tertiary Examination (Ejimonye et al., 2021). During online examinations, students are expected to independently complete their computer-based tests without any external assistance. However, some students who are unfamiliar with electronic learning may seek help from invigilators or technical assistants throughout the entire examination process (Kennedy & Ebuwa, 2020). This study explores the multifaceted aspects of technology-enhanced learning in senior secondary schools, specifically focusing on the challenges and prospects of e-learning in Ilorin, Kwara State, Nigeria.

After completing ten years of elementary school and passing the Basic Education Certificate Examination (BECE) and the Junior Arabic and Islamic Studies Certificate Examination (JAISCE), among others, children in Nigeria go on to senior secondary school (Lawan et al., 2020; Jacob & Stephen, 2021). Anyone can get this credential and go on to further education, regardless of their gender, socioeconomic situation, religion, or ethnicity. Children in Nigeria gain the technical, vocational, entrepreneurial, and economic abilities necessary for agricultural, industrial, commercial, and economic growth at this level of school. In addition, students in these groups are required to have some experience with basic technology before graduating from high school. This is especially true for those who plan to continue their education beyond high school. Courses in areas like basic electricity, electronics, general metalworking, and others in the technology curriculum came about because the Federal Republic of Nigeria's National Policy on Education had previously planned to promote E-learning and the effective use of innovation in Nigerian schools by bolstering information and communication technology (FRN, 2013).

Bubou and Job (2021) argued that electronic learning environments and e-learning may increase the quality of education. This is an indication that those in secondary school, benefit from the opportunity to utilise the internet as an extension of their actual classroom. According to Cavus and Sekyere-Asiedu (2021). Classroom, Zoom Cloud Meeting, as well as Microsoft Teams are just a few of the web-based platforms that secondary schools use as virtual conference rooms and electronic classrooms, As defined by Mezieobi and Njoku (2012), electronic education encompasses all types of mechanisations, devices, machines, or equipment that rely on a power source to facilitate teaching and learning. devices like laptops, smartphones, tablets, the web, email, and the internet fall under this category. Further examples of software that is inseparable from electronic devices include PDF, Microsoft Word, PowerPoint, Excel, etc. (Ajewole et al., 2021). Consequently, the recognised hardware and software applications would be evaluated in tandem with the perceived aspects linked to the incorporation of electronics into the curriculum of senior secondary schools.

Technology is advancing at a breakneck pace, according to Hernandez-de-Menendez et al. (2020). However, not everyone is familiar with the inner workings of the devices utilised in this educational process. It was also noted that some individuals struggle to afford this kind of learning and assessment, especially when it comes to the expense of internet access. Anza et al. (2019) stated that to integrate e-learning into senior secondary education, the school, instructors, and students must be prepared to put these curricula into action. Access to the electronic learning environment and equitable learning are two of the primary motivations for this level of electronic instruction and learning. Other reasons include an unlimited learning environment, greater incentive for students to learn, chances to do self-testing as well as assessment, and the ability to link external resources, which opens up pathways to all other online learning spaces (Damuri et al., 2021; Pregowska et al., 2021). Students are able to safely navigate both real-time and delayed learning environments because of these chances (Adesina, 2021). According to Bubou and Job (2021), there are many advantages to online education, including: Enhancing the standard of education; Fulfilling the responsibility of training a fresh cohort of educators and enhancing the competencies of current ones to align with the demands of twenty-first-century teaching methodologies; E-learning promotes active learning, enables learners to study at their own speed, and facilitates collaborative and cooperative learning activities among students; Additionally, it develops students' higher-order thinking abilities and improves their retention of information and so on.

This demonstrates that technology has a significant impact on education at all levels. The support for E-learning stems from the fact that all participants in education possess the ability to acquire fundamental technological knowledge and use it as a means to achieve educational objectives. Based on the previous information, students have the freedom to engage in self-study at their own speed, which helps them maintain their enthusiasm for learning at regular intervals. Nevertheless, the obstacles associated with adopting the advantages of E-learning persist, even after a considerable amount of time has passed since the widespread adoption of E-learning worldwide. The challenges of implementing electronic educational processes in developing countries, including Nigeria, can be summarised as follows: insufficient computerization along with access to the internet due to uneven distribution of rapid connectivity broadband; deteriorating power infrastructure; inability to afford the necessary educational materials as well as devices for e-learning experiences (Bubou & Job, 2021; Mahmood, 2021; Adarkwah, 2021). Challenges faced by teachers and learners include variations in E-readiness, as many individuals still lack fundamental computer skills required for online learning. Additionally, both learners and teachers may exhibit poor study habits, leading to feelings of isolation, limited peer-to-peer interaction, and a lack of engagement. Another challenge is the absence of immediate response from instructors and facilitators when it is needed. Insufficient knowledge and technical issues, as well as lack of commitment from teachers and students, are barriers to integrating e-learning at certain stages of implementation. These barriers are identified by teachers and learners as irrelevant instructional resources. (Kalkan et al., 2020; Priyadarshini & Bhaumik, 2020; Çaliskan & Caner, 2022).

Additional factors include inflexible school networking regulations, limited hardware accessibility, and the uncertainty linked to technology integration. Furthermore, deficiencies in writing, computer proficiency, and communication skills contribute to the challenges (Ali, 2017). These issues indicate that the development of E-learning in Africa is still in its early stages and has not yet been fully integrated into African schools. In their contribution, Mezieobi and Njoku (2012) submitted that professionalism of teachers as possessing a comprehensive understanding of the theory of knowledge, the nature of reality, and values in teaching. As a result, instructors are required to actively promote successful teaching and learning in electronic education. Mezieobi and Njoku further argue that Nigeria, as a developing country, faces numerous challenges in implementing effective electronic teaching and learning. However, there is still a lack of understanding regarding the full scope of electronic education at the senior secondary level. Therefore, it is necessary to analyse the elements linked to successful/unsuccessful electronic education in senior secondary schools. This research aims to identify the parameters correlated with the incorporation of electronic teaching and learning in senior secondary school in Ilorin, as seen by the instructors. The study addressed and resolved two research inquiries, which are as follows:

1. What are the hindrance factors for the adoption of electronics teaching and learning among senior secondary schoolteachers in Ilorin?
2. What are the electronic devices and application software adopted for teaching and learning at the senior secondary school level in Ilorin?

Only one hypothesis was tested in the study:

Ho: There is no significant difference in the perception of senior secondary school teachers on the hindrance factors of the adoption of electronic teaching and learning in Ilorin.

### Methodology

The study is classified as a descriptive survey investigation. This study is deemed very important since it entails analysing the strong correlation between the perspective of senior secondary school instructors and the barriers that impede the use of electronic teaching and learning. The survey included all senior secondary school teachers in Ilorin in its population. Ilorin consists of three local governments: Ilorin East, Ilorin South, and Ilorin West. A total of 225 senior high school teachers from three local governments were selected for the research using a simple random selection procedure. A total of 75 instructors were chosen from each local government.

Data collection was conducted using a self-designed questionnaire that focused on obstacles related to electronic teaching and learning. The questionnaire was partitioned into three sections. The first section aimed to gather the demographic information of the senior high school instructors who participated in the survey. The second section encompassed the items that assessed the barriers to the implementation of electronic teaching and learning among senior school teachers, while the third section encompassed the items that evaluated the electronic devices and application software utilised for teaching and learning at the secondary school level. The instructors were instructed to evaluate the questions of the questionnaire by indicating their degree of agreement on a four-point Likert Scale, with Strongly Agree assigned 4 points, agree assigned 3 points, disagree assigned 2 points, and Strongly Disagree assigned 1 point. Information and communication technology (ICT) and test and measurement (TM) specialists verified the survey items.

There were 36 junior secondary school instructors who were given the updated survey. Using the Cronbach Alpha, we were able to ascertain that the pilot questionnaire was trustworthy for the research; a reliability score of 0.79 was reported. The study issues were addressed by analysing the acquired data using mean and rank order. and independent t-test.

### Results

#### Answering Research Questions

**Research Question 1:** What are the factors hindering the adoption of electronic teaching and learning among senior secondary school teachers in Ilorin?

**Table 1**

*Mean Ranking on Factors Hindering the Adoption of Electronic - Learning among Senior Secondary School Teachers*

S/N	Factors Hindering Adoption of Electronic – Learning	Mean	Rank
1	Teachers are not ready to use electronic devices in my school	1.78	11 <sup>th</sup>
2	Free access to educational resources is available in my school	2.69	5 <sup>th</sup>
3	The interpretation of some of the application software put off some of the teachers who showed interest in E-teaching	2.73	4 <sup>th</sup>
4	There is the constraint of poor internet connectivity in my school	2.59	8 <sup>th</sup>
5	Learning online is uninteresting to teachers due to the absence of a facilitator	2.01	10 <sup>th</sup>
6	Schools cannot afford the cost of teachers accessing the internet	2.67	6 <sup>th</sup>
7	The schools are faced with the problem of irregular electricity power supply	2.66	7 <sup>th</sup>
8	Most teachers have no information technology or computer education knowledge	2.74	3 <sup>rd</sup>

9	Electronic- Learning exposes teachers to other activities that make them lose interest	2.83	2 <sup>nd</sup>
10	The cost of some of the devices put off some of the teachers who showed interest	3.02	1 <sup>st</sup>

**Weighted Average Mean: 2.56 Threshold: 2.50**

Teachers' feedback to the obstacles preventing the widespread use of e-learning are shown in Table 1. The level of consensus among the educators is shown by it. With a weighted average mean of 2.56, we can see that there is little disagreement numerically. Just on points 1 and 5 did the educators reach a consensus. Consequently, among Ilorin's senior secondary school teachers, the majority felt that items 2, 3, 4, 6, 7, 8, 9, 10, and 11 were the most important considerations while implementing e-learning.

**Research Question 2:** What are the electronic- learning devices used for learning in secondary school level?  
**Table 2**

*Percentage Responses of Electronic- Teaching and Learning Devices Used at Secondary School Level*  
**Electronic- Learning Tools** **Used** **Not Used**

These Devices and Applications are used	Used	Not Used
Tablet	78 (53.1)	69 (46.9)
Interactive whiteboard	121 (82.3)	26 (17.7)
Laptop	90 (61.2)	57 (38.8)
Television (TV)	27 (18.4)	120 (81.6)
Computer	126 (85.7)	21 (14.3)
Mobile phones	64 (43.5)	83 (56.5)
PDF files	86 (58.5)	61 (41.5)
Microsoft word	108 (73.5)	39 (26.5)
PowerPoint	83 (56.5)	64 (43.5)
Excel	88 (59.9)	59 (40.1)

Table 2 displays the various electronic gadgets and application software used for instruction and learning in Ilorin's secondary schools. At the 50% benchmark, it shows which devices and application software are in use and which ones are not. Ilorin makes use of a variety of technological tools for instruction and study, including desktop computers, laptops, tablets, and interactive whiteboards. The senior high school uses Microsoft Office, which includes Word, Excel, PDFs, and PowerPoint.

### Hypotheses Testing

**Hypothesis One:** There is no significant difference in the perception of senior secondary school teachers on factors hindering the adoption of electronic teaching and learning in Ilorin based on gender.

**Table 3**

*t-test on Factors Hindering the Adoption of Electronic-Teaching and Learning in Ilorin Based on Gender*

Gender	N	Mean	Std. Deviation	T	df	Sig. (2-tailed)
Male	74	16.25	4.25022			
Female	151	15.67	8.14060			
				$\alpha = 0.05$	$P > 0.05$	H01 not rejected.

Table 3 displays the outcome of the t-test analysis conducted on the perspective of secondary school teachers on the obstacles to the implementation of electronic teaching and learning in Ilorin, categorised by gender. The analysis yields a computed t-value of 1.578 and a p-value of .117, obtained from a test conducted at a

significance level of 0.05. There was no statistically significant difference in the observed values between males (mean = 16.2540, standard deviation = 2.25022) and females (mean = 15.6786, standard deviation = 2.14060;  $t(145) = 1.578$ ,  $p = .117$ , two-tailed). Given that the P-value is higher than the alpha level ( $p > 0.05$ ), the only hypothesis that can be supported is the one under consideration. This suggests that the attitude of secondary school teachers in Ilorin about the obstacles to the use of electronic teaching and learning is not significantly influenced by gender.

### **Discussions**

Concerning the instruments and software used for electronic education and instruction. The survey revealed that the electronic instructional tools employed in senior secondary education in Ilorin include PCs, whiteboards with interactive elements, laptops, and tablets. The application software used included Microsoft Excel, Word, PDF files, and PowerPoint (Ajewole et al, 2021). The instructors possess implicit knowledge of such gadgets, although they lack the ability to use technological education. The most often mentioned challenge by the respondents was that the expense of various gadgets deterred interested instructors. This aligns with the discovery made by Ali, (2017), Mezieobi and Njoku (2012), educational system in Nigeria. Furthermore, the respondents identified the fact that Electronic-Learning exposes instructors to other activities that diminish their interest as the second most significant cause. In addition, the absence of IT expertise or computer education was rated third, along with the results of Afshari et al. (2013), and Hrtoňová et al. (2015). Also, the research revealed that gender does not have a substantial impact on the view of secondary school teachers in Ilorin about the obstacles to the implementation of electronic teaching and learning. There is no variation in the instructors' opinion of the obstacles to implementing electronic teaching and learning in senior secondary schools in terms of gender.

### **Conclusion**

The adoption of electronic-teaching and learning among senior secondary school teachers in Ilorin is hampered by several factors, including the high cost of electronic devices, limited knowledge of information technology or computer education, restricted ability to utilise educational resources, expensive internet access, unreliable connection to the internet as well as electricity, as well as educators finding online learning uninteresting.

Furthermore, electronic equipment adopted includes computers, interactive whiteboards, laptops, and tablets were recognised as the technological tools used for educational purposes at senior secondary schools in Ilorin. Additionally, application software such as Microsoft Word, Excel, PDF files, and PowerPoint were utilised for instructional activities. Although there are difficulties in incorporating new technologies into senior secondary school, the usage of electronic- driven and computer software in education at this level is now a permanent fixture due to its effective instructional delivery.

### **Recommendations**

The findings of the research indicate that those in charge of education in Nigeria have to realise the challenges that are involved with the implementation of electronic teaching and learning in senior secondary schools. It is imperative that the government, and more especially the Ministry of Education, take action in order to formalise the process of establishing electronic education as a system. By doing so, the government will be able to formulate rules that will make it easier to enforce the adoption of electronic learning and teaching into secondary school. This will guarantee that the necessary resources and materials for electronic teaching and learning are easily accessible to both instructors and students, and that they are promptly available to them.

It is vital to offer basic utilities such as dependable electricity, as well as alternative power sources such as power inverters and solar energy, to facilitate the efficient utilisation of electronic teaching and learning in senior secondary schools in Ilorin. This is because it is essential to encourage the effective utilisation of electronic teaching and learning. In addition, to make it easier for instructors to utilise technological devices, a subsidised internet connection must be made accessible to them.

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