# APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) FOR EFFECTIVE INSTRUCTIONAL DELIVERY IN PUBLIC SENIOR SECONDARY SCHOOLS IN RIVERS STATE

## Judith O. Patrick
judypee4real@gmail.com

**Department of Library and Information Science, Faculty of Education, Delta State University, Abraka**

## ABSTRACT

In every state's senior secondary public schools, the research examined how information and communication technology (ICT) are used to provide instruction effectively. The research used a descriptive survey approach. Seven thousand, one hundred seventy-nine (7179) people in all, including teachers and administrators, made up the entire population. Seven hundred and eighteen (718) people were included in the study's sample, which represented 10% of the overall population. Data were gathered using a self-designed survey called the "Application of Information and Communication Technologies for Effective Instructional Delivery in the Administration of Public Senior Secondary Schools in Rivers State Questionnaire (AICTEIDAPSSQ)" that was obtained. The reliability of the instrument was determined utilizing a test-retest procedure and the Person Product Moment Correlation Coefficient (PPMCC). While z-test statistics were employed to test the hypotheses at a 0.05 level of significance, the mean and standard deviation were utilized to provide answers to the study questions. Findings showed that since ICT tools are not easily accessible, there is little use of them. Additionally, results indicate that virtually all of the schools studied lacked computers and internet connectivity, and applications that depend on availability suffer as a result, contributing to poor usability. Based on the foregoing, it was thus suggested, among other things, that the government should provide a conducive learning environment for the use of ICT in public schools in Rivers State, continuous training and retraining of staff/administrators to make them capable of applying the available ICT tools, and government should provide funds for the running cost of ICT maintenance in the schools. To provide a wider perspective, the research recommended that comparable exercises be done in other states around the nation.

**Key words:** Information and communication technologies, effective instructional delivery, computer, internet

## INTRODUCTION

Internet computers are one of the many information and communication technology (ICT) tool types. Without a doubt, the internet has emerged as the most interesting, dynamic, and visibly changing new technical instrument. The internet's potential for use in education is expanding to the point that students may now access stuff outside of the confines of the classroom as well as textbooks. The computer, on the other hand, responds to student input almost immediately, has a vast capacity for information storage and manipulation, and is unparalleled in its potential to assist several students at once. It has surely evolved into a preferred teaching tool for many universities and colleges in wealthy nations, as was made clear at the time when the Covid epidemic brought the whole globe to a stop. Both instructors and students may benefit from the rich experiences that the computer offers, which gives them the ability to shape the depth and course of their teaching and learning. Additionally, it has the capacity to coordinate and manage a wide range of media, including printed material that can track, examine, and respond to student responses. The computer also performs administrative tasks including class scheduling, managing student data, and maintaining school records. Thus, effective use of information and communication technologies has greatly aided teachers (administrative staff) in providing instructions to students in the area of general information disseminations, such as student registration, calendar, timetable, resumption date, typing circulars and memos to students and parents, etc. Information and communication technology (ICT) is essential for enhancing the quality of instruction. It's no surprise that ICT applications for administration and management have become commonplace at universities, what with all the good they can do for anything from storing data to managing knowledge and making decisions.

According to Wikipedia, "information and communication technology" (ICT) is an offshoot of "information technology" (IT) that places an emphasis on "unified communication" and "the integration of telecommunications (telephone lines and wireless signals) and computers" (along with the necessary enterprise software, middleware, storage, and audiovisual that enables users to access, store, transmit, understand, and manipulate information). As defined by Mukoro (2011), ICT includes the use of digital and electronic technologies including computers, the internet, telephones, multimedia projectors, etc. for the purposes of processing, storing, and distributing information. Additionally, he said that the equipment greatly facilitates efficient and effective information processing, storage, retrieval, and dissemination in the management of contemporary commercial organizations. To complete tasks in the most efficient manners, the administrator must assign work to subordinate staff members including teachers, non-teaching personnel, and students. It is more focused on the institution, its objectives, policies, and how these policies are carried out. There is evidence that, in order for ICT to be successful in education, it must be completely included into the pedagogy. In particular, when teaching reading and arithmetic, 'Blended Learning,' which combines ICT and writing to learn, generates higher outcomes than conventional techniques alone or ICT alone. The enhancement of teaching, learning, and all other

school activities is the primary goal of the management of the school. Thus, school administration bears the heavy burden of ensuring that the education provided by the school fully develops each student's unique potential and produces individuals who are well-rounded and compatible in all areas of life, including the emotional, intellectual, spiritual, and technological. UNESCO emphasises the importance of technology in education through promoting the use of ICTs in the classroom**.**

## Statement of the Problem

Information and communication technologies are one area that requires development and competition. These technologies foster positive dynamics of technology transfers, support the dissemination of best practices, encourage the implementation of new management decisions, and address problems that impede the expansion of secondary school education, particularly the complexity of information available in secondary schools. This keeps growing significantly, which increases the management of data and makes it more difficult to handle. Due to the rapid growth in the number of students in the state of Rivers and the multiplicity of programs, secondary schools must manage a large volume of data that must be processed quickly in order to provide information for management decisions and to effectively deliver instruction and track student progress. In the lack of ICT tools, this has led to several complications. In an effort to address this issue, the Rivers state government has provided ICT resources, such as computer systems, to secondary schools all around the state to facilitate teaching-learning and administrative procedures in the classrooms. Despite the government's attempts to provide schools with ICT resources, it seems that there is still little use of these resources in school administration.

Furthermore, one of the persistent problems with secondary schools is the ineffective way in which students are instructed. Examples include processing students' academic records, disseminating general information, registering students and documenting their records, providing details on students' examination procedures, and even reporting drop-off rates. The ability of students, teachers, administrators, and principals to utilize these facilities is also quite low, and it's possible that there aren't enough of them to enable an inclusive ICT-based education system. Therefore, it is imperative to determine whether implementing information and communication technology into the educational system will improve teaching and learning activities, improve the prompt delivery of instructions to students, and enable secondary school administrators to quickly process the available data to provide information for management decisions. Additionally, it is important to determine if using ICT in secondary schools would make maintaining student data in such institutions simpler despite the massive increase in student enrollment. The researcher conducted this investigation exactly as stated in the note.

**Aim and Objectives**

The study's primary objective was to investigate how information and communication technologies (ICT) are used in public senior secondary schools in Rivers State to provide education effectively. The research specifically aimed to accomplish the following goals:

1. Identify the types of information and communication technology facilities used in Rivers state's public senior secondary schools for efficient instruction delivery.
2. Identify the degree to which computers are used in public senior secondary schools in Rivers state as information and communication technology tools for successful instruction delivery.
3. Determine the degree to which the internet is being used as an information and communication technology tool to offer education in Rivers State's public senior secondary schools.

**Research Questions**

In order to direct the study, the following research questions were put out based on the aforementioned objectives:

1. What kinds of information and communication technology resources are used in Rivers State's public senior secondary schools to provide education effectively?
2. To what degree do public senior secondary schools in Rivers state use computers as an information and communication technology tool for efficient instructional delivery?
3. To what degree are public senior secondary schools in Rivers State using the internet as an information and communication technology tool to provide education effectively?

**Hypotheses**

The following null hypotheses was formulated to further guide the study and to be tested at 0.05 level of significance.

$H_{01}$: There is no significant difference between the mean ratings of principals and teachers of public senior secondary school on computer as an information and communication technology tool applied for effective instructional delivery in public senior secondary schools in Rivers State.

$H_{02}$: There is no significant difference between the mean ratings of principals and teachers of public senior secondary school on internet as an information and communication technology tool applied for effective instructional delivery in public senior secondary schools in Rivers State.

**Methodology**

The study used a descriptive survey approach. The total number of public senior secondary schools in Rivers State—286 in all—was the study's population. These schools were spread out throughout

the 23 local government areas (LGA) in Rivers State. Seven hundred and eighteen (718) respondents—or 10% of the entire population of respondents—make up the study's sample size. The research used the stratified random sampling method. Application of Information and Communication Technologies (ICT) for Effective Instructional Delivery in The Administration of Public Senior Secondary Schools Questionnaire was the tool used for data collection in this research (AICTEIDAPSSQ). Face and content validity tests were conducted on the study's instrument. The Pearson Product Coefficient Moment Correlation method was used to determine the instrument's level of dependability (PPMCC). In order to answer the study questions, data was collected from the field, and mean scores and standard deviation were used. Z-test statistics was then employed to test the null hypotheses at the significance level of 0.05. Data analysis was done using the statistical Package for Social Sciences (SPSS).

## Results and Discussion of Findings

### Demographic Characteristics of the Respondents

**Table 1: Summary of Frequency Distribution of Respondents based on Gender**

|       |        | Frequency | %     | Valid % | Cumulative % |
|-------|--------|-----------|-------|---------|--------------|
| Valid | Male   | 334       | 51.7  | 51.7    | 51.7         |
|       | Female | 312       | 48.3  | 48.3    | 100.0        |
|       | **Total** | **646** | **100.0** | **100.0** |         |

According to the data in Table 4.1 above, men made up the majority of the participants [F=334(51.7%)], while women made up the remaining participants [F=312(48.3%)].

**Table 2: Summary of Frequency Distribution of Respondents based on Position**

|       |           | Frequency | %     | Valid % | Cumulative % |
|-------|-----------|-----------|-------|---------|--------------|
| Valid | Teacher   | 617       | 95.5  | 95.5    | 95.5         |
|       | Principal | 29        | 4.5   | 4.5     | 100.0        |
|       | **Total** | **646**   | **100.0** | **100.0** |          |

According to the data in Table 4.2 above, teachers made up the bulk of the participants [F=617(95.5%)], while principals made up the remaining participants [F=29(4.5%)].

**Research question 1:** What types of information and communication technology facilities are applied for effective instructional delivery in public senior secondary schools in Rivers state?

**Table 3:** Mean and Standard Deviation on the types of information and communication technology facilities that are applied for effective instructional delivery in public senior secondary schools in Rivers State

**N=646**

| S/N | ITEMS | x | S.D | Remark |
|---|---|---|---|---|
| 1. | Computers | 2.38 | 1.05 | Disagree |
| 2. | Internet Facilities | 2.36 | 1.01 | Disagree |
| 3. | Projectors | 2.06 | 0.89 | Disagree |
| 4. | Radios and Television | 2.25 | 1.01 | Disagree |
| 5. | Interactive whiteboard | 1.56 | 0.92 | Disagree |
| 6. | Scanner | 1.92 | 0.95 | Disagree |
| 7. | Printer &Photocopier | 2.43 | 1.06 | Disagree |
| 8. | CD ROM & Flash drives | 2.42 | 1.11 | Disagree |
| 9. | Recorders | 2.06 | 0.99 | Disagree |
| 10. | Telephones/intercom | 2.37 | 1.10 | Disagree |
| 11. | E – library | 1.23 | 1.11 | Disagree |
| 12. | Electronic Bulletin board | 2.13 | 1.00 | Disagree |
|  | **Grand Mean Set & S.D** | **2.10** | **1.02** | **Disagree** |

**Key word: S.D – Standard Deviation, x – Mean**

In Table 3, twelve (12) elements were evaluated to ascertain the kinds of ICT facilities used for efficient instructional delivery in Rivers State's public senior secondary schools. All of the evaluated tools, numbered 1 through 7, had mean scores between 1.56 and 2.43, which fell short of the required mean score of 2.50. Given that the overall average score was 2.10, this indicates that none of the evaluated instruments were properly used for efficient instruction delivery in public senior secondary schools in Rivers State.

In conclusion, the respondents did not agree that the use of computers, the internet, projectors, radios, televisions, interactive whiteboards, scanners, printers, and photocopiers, as well as recorders, telephones with intercoms, the electronic library, and electronic bulletin boards, is not a reasonable application for the effective delivery of instruction in public senior secondary schools in Rivers State.

**Research question 2:** To what extent are computer as ICT tool applied for effective instructional delivery in the administration of public senior secondary schools in Rivers State?

**Table 4.3:** Mean and Standard Deviation on the extent to which computer as ICT tool applied for effective instructional delivery in the administration of public senior secondary schools in Rivers State

**N=646**

| S/N | ITEMS | x | S.D | Remark |
|---|---|---|---|---|
| 13. | Computers are applied in lesson preparation and preservation for subsequent delivery | 1.74 | 1.01 | Low Extent |
| 14. | Computers are applied for students Data collection such name, sex, age class, etc. | 2.44 | 1.04 | Low Extent |
| 15. | Computer is applied in generating of student's registration number. | 1.66 | 0.91 | Low Extent |
| 16. | Computers are applied for record keeping for all activities in the school and for easy retrieval. | 1.68 | 1.05 | Low Extent |
| 17. | Computer is applied in the use of educational software and programs to facilitate personalized online instruction for studies | 1.39 | 0.76 | Low Extent |
| 18. | Computers are used by educators and administration to help students learn to type and do other duties**.** | 1.56 | 0.98 | Low Extent |
| 19. | Computer as an ICT facility is applied in analysing and interpreting the data of the school in terms of population, facilities, etc. for easy administration and quality education. | 1.73 | 0.97 | Low Extent |
| | **Grand Mean Set & S.D** | **1.74** | **0.96** | **Low Extent** |

**Key word: S.D – Standard Deviation, x – Mean**

To evaluate the degree to which computers are used as an information and communication technology tool for efficient instruction delivery in public senior secondary schools in Rivers State, seven (7) elements were included in Table 4. The mean scores of all the evaluated items, which were numbered 13 to 19, varied from 1.66 to 2.44, falling short of the required mean score of 2.50. The grand mean score was 1.74, which indicates that the use of computers as an information and communication technology tool is not generally appropriate for providing effective education in public senior secondary schools in Rivers State. In conclusion, the respondents concurred that a very limited amount of lesson preparation, student data collection, population data analysis and interpretation, generation of student registration numbers, record keeping, use of educational software, and typing for efficient instruction delivery in public senior secondary schools in Rivers state do not make reasonable use of computers as ICTs.

**Research question 3:** To what extent is internet as an ICT tool applied for effective instructional delivery in the administration of public senior secondary schools in Rivers State?

**Table 4.4:** Mean and Standard Deviation on the extent to which internet facilities as an ICT tool applied for effective instructional delivery in the administration of public senior secondary schools in Rivers State

N=646

| S/N | ITEMS | x | S.D | Remark |
|---|---|---|---|---|
| 20. | Internets facility is applied as a means of communication between the principal and teachers through creation of platforms in social media | 1.74 | 1.01 | Low Extent |
| 21. | Teachers use the internet to research and update new methods for delivering lessons to their students. | 1.92 | 1.15 | Low Extent |
| 22. | Using the internet's resources, principals may get reliable data that speeds up administrative tasks. | 1.95 | 1.14 | Low Extent |
| 23. | The Internet is used as an ICT by principals to provide information to teachers, staff, and parents. | 2.42 | 1.11 | Low Extent |
| 24. | Teachers and principals use the internet for a variety of research projects. | 1.82 | 1.05 | Low Extent |
| 25. | Principals and instructors use the Internet to research and find solutions to pressing problems. | 2.25 | 1.09 | Low Extent |
| 26. | A growing number of administrators are turning to online methods of publicising their institution in an effort to attract new pupils | 2.08 | 0.95 | Low Extent |
| | **Grand Mean Set & S.D** | **2.03** | **1.07** | **Low Extent** |

**Key word: S.D – Standard Deviation, x – Mean**

The use of internet facilities as an information and communication technology tool for successful instruction delivery in public senior secondary schools in Rivers State was evaluated using seven (7) elements in Table 4.4. The mean scores of all the evaluated items, which were numbered 20 to 26, varied from 1.74 to 2.42, falling short of the required mean value of 2.50. Given that the grand mean score was 2.03, it follows that internet access is only sometimes used as an information and communication technology tool for efficient instruction delivery in public senior secondary schools in Rivers State. In conclusion, respondents agreed that internet facilities as an ICT tool are not realistically applied as a means of communication between principals and teachers through the creation of platforms; by teachers to update their lesson notes with new ideas for effective instructional delivery; by the principals to get effective information that will aid progress in administrative works; by principals in sending memos, newsletters, and emails to staff; and by staff to stay informed about school events and news.

**Test of Hypotheses**

**Hypothesis 1:** There is no significant difference between the mean ratings of principals and teachers of public senior secondary school on how computer as an information and communication

technology tool is applied for effective instructional delivery in public senior secondary schools in Rivers State.

**Table 5:** z -test Analysis on the significant difference between the mean ratings of principals and teachers on the application of computer as an ICT tool for effective instructional delivery in public senior secondary schools in Rivers State

| Source of Variation | N | Mean | Variance | SD | Df | z-cal. | z-crit. | Sig. | Decision |
|---|---|---|---|---|---|---|---|---|---|
| Teachers | 617 | 1.60 | 0.71 | 0.84 | 644 | 1.23 | ±1.96 | 0.05 | Not Significant |
| Principals | 29 | 1.48 | 0.67 | 0.82 | | | | | |

In order to give successful education, computers are used as an ICT tool in public senior secondary schools in Rivers State. Table 5 summarizes the mean, variance, standard deviation, and z-test of the difference between the mean ratings of teachers and principals on this topic. It was discovered that teachers' mean and standard deviation scores were 1.60 and 0.84, respectively, whereas principals' values were 1.48 and 0.82. The z-calculated value, which was utilized to test the hypothesis, was 1.23, and the z-critical value, which was computed utilizing 644 degrees of freedom, was 1.96. The estimated z-test result of 1.23 is less than the z-critical value of 1.96 at the 0.05 level of significance, hence the null hypothesis is accepted. Since computers are used as an information and communication technology tool to offer successful education in public senior secondary schools in Rivers State, there is no discernible difference in the mean ratings of teachers and administrators.

**Hypothesis 2:** There is no significant difference between the mean ratings of principals and teachers of public senior secondary school on how internet as an Information and communication technology tool is applied for effective instructional delivery in public senior secondary schools in Rivers State.

**Table 6:** z -test Analysis on the significant difference between the mean ratings of principals and teachers on the application of internet as an ICT tool for effective instructional delivery in public senior secondary schools in Rivers State

| Source of Variation | N | Mean | Variance | SD | Df | z-cal. | z-crit. | Sig. | Decision |
|---|---|---|---|---|---|---|---|---|---|
| Teachers | 617 | 1.69 | 0.85 | 0.92 | 644 | 1.73 | ±1.96 | 0.05 | Not Significant |
| Principals | 29 | 1.54 | 0.83 | 0.91 | | | | | |

The mean, variance, standard deviation, and z-test of the difference between the mean evaluations of teachers and principals on the use of the internet as an ICT tool for efficient instructional delivery in public senior secondary schools in Rivers State are summarized in Table 6. It was found that although principals had a mean and standard deviation of 1.54 and 0.91, respectively, teachers had a mean and standard deviation of 1.69 and 0.92. The z-calculated value, which was utilized to test the hypothesis, was 1.73, and the z-critical value, which utilised 644 degrees of freedom, was 1.96. The estimated z-test result of 1.73 is less than the z-critical value of 1.96 at the 0.05 level of significance, hence the null hypothesis is accepted. As a result, there is no discernible difference in teachers' and principals' mean ratings of the effectiveness of using the internet as a medium for information and communication in Rivers State's senior secondary public schools.

**Discussion of the Findings**

Research question one confirmed the theory. The B section of the questionnaire's items 1 through 12 were thoughtfully written to respond to this question. The secondary school respondents disputed that the stated ICT facilities are not adequately utilized for efficient instructional delivery in public senior secondary schools in Rivers state, as shown by the grand mean of 2.10 (SD=1.02). This finding is in line with that of Everest and Laura (2011), who found that students had very little access to e-learning resources in Nigerian universities and that these resources were underwhelming. It also lines up with Asako and Nwuke (2020), who found that ICT resources were not being used to their full potential. The study's findings, however, do not concur with those of Jegede (2004) and Jegede and Owalabi (2008), who found that Nigeria has made significant advancements in the evaluation and accessibility of information and communication technology resources. According to the researchers, in order for students to learn, instructors to teach successfully, and administrators to operate an efficient administration for effective instructional delivery, information and communication technology facilities must be provided.

The second research question confirmed the goal, and the first null hypothesis was used to test it. The questionnaire's B section's items 13 through 19 were thoughtfully written to provide an answer to this query. The grand mean was 1.74 (SD=0.96), showing that respondents from the secondary schools under research were mostly in agreement that computers as ICT tools are not effectively used in the management of public senior secondary schools in Rivers State. According to Table 4.8's findings, the degree of freedom is 644, the z-calculated value is 1.23, and the z-critical is 1.96 at 0.05 level of significance. The null hypothesis is maintained since the z-calculated value is lower than the z-critical value, which is 1.96. This suggests that the principals' and teachers' mean assessments of the use of computers as an information and communication technology tool for successful teaching in public senior secondary schools in Rivers State do not significantly vary from one another. In conclusion, instructors (mean=1.60; SD=0.84) utilize computers more often for efficient instruction delivery than do principals (mean=1.48; SD=0.82). This conclusion is in line with that of Nwite (2007), who stated that usability—a factor that depends on availability—was also found to be subpar since there were few computers and connections to the internet

available in almost all of the schools he looked at. The results are in line with those of Anumnu (2008), who found that the lack of resources for information and communication technology in schools hampers its real use in our educational system. Edet and Francis (2013) agreed with Nwite and Anumnu's assessment that information and communication technology devices are not widely used in Cross River State.

The purpose of the third research question was to verify the objective, and the second null hypothesis was tested. The questionnaire's B section's items 20 through 26 were particularly created to reply to this inquiry. The respondents from the secondary schools under inquiry agreed, on average, to a low degree that internet resources are employed as ICT tools for effective instructional delivery in the administration of public senior secondary schools in Rivers State, as demonstrated by the grand mean of 2.03 (SD=1.07). Table 4's outcome reveals that the degree of freedom is 644, the z-calculated value is 1.73, the z-critical is 1.96 at 0.05 level of significance, and the z-critical is 1.96. The null hypothesis two is maintained since the z-calculated value is lower than the z-critical value, which is 1.96. This suggests that there is no appreciable difference in the principals' and teachers' mean assessments of the public senior secondary schools' use of the internet as an ICT tool for successful instruction delivery in Rivers State. In conclusion, instructors (mean=1.69; SD=0.92) utilize online resources more often for effective instruction delivery than principals (mean=1.54; SD=0.91). This conclusion is in line with that of Nwite (2007), who claimed that the availability of computers and their access to the internet were nonexistent in almost all of the schools investigated, and use, which depends on availability, was found to be low as a result. The results are consistent with those of Ajayi and Ekundayo (2009) who found that internet access was not common in schools and that instructors and pupils had very limited exposure to ICT. The researchers believed that the lack of availability of information and communication technology, as well as the ineffective use of these tools when they are accessible, were the two main challenges facing the implementation of these technologies for teaching and learning. The researchers believe that in order for information and communication technology to be used properly, tools must be made accessible.

**Conclusions**

This study has shown that the types of information and communication technology tools listed in the study are not used for effective instructional delivery, and that public senior secondary schools in Rivers state did not use computers or internet facilities for effective instructional delivery to a significant extent. It was advised as a result of the results that there is no question that using ICT in the management of public senior secondary schools in Rivers State would result in academic competency within the educational system. Unfortunately, due to a number of contributing factors, including erratic power supplies, improper maintenance of ICT facilities and services, a lack of qualified personnel to manage ICT software and hardware in the schools, and poor government policies to coordinate use of ICT in the classroom, public senior secondary schools in Rivers State do not have ICT facilities and a low rate of application of ICT facilities to meet 21st century

change. The researchers came to the conclusion that successful teaching and learning would occur concurrently in Rivers State senior secondary schools if projectors, computers, software packages, and internet capabilities are significantly given required. According to the results, Rivers State's senior secondary needs proper access to information and communication technology tools.

## Recommendations

The following suggestions were given in light of the study's disclosed findings:

1. The government should create an atmosphere that encourages the use of ICT in Rivers State's public schools.
2. Staff and administrators should get ongoing training and retraining to prepare them to use the ICT capabilities that are available.
3. For ICT facilities to operate correctly, the government should provide an environment that is supportive, such as a reliable power supply.

## REFERENCES

Bandele, M. (2006). Development of modern ICT and internet system. In A. A. Agagu (Ed), *Information and communication technology and computer applications.* Pan of Press.

Federal Republic of Nigeria. (2012). *National policy on education.* NERDC Press.

Lim, S., & Tay, S. (2003). *Types of ICT tools.* https://www.uniassignment.com/essay-samples/education/types-of-ict-tools-education-essay.php.

Louissaint, B., Jimoh, A., TLevin, M., & Afrafeh, C. (2020). Students' attitude toward ICT in Nigeria tertiary institutions. *Education Focus 1*(1), 73 – 79.

Lubis, S., Nwankudo, C., Oguejiofor U., & Nwankwo, C. (2019). *Innovative tool for teaching and learning in education.* Coal City Publishing Company.

Mukoro, I. G. (2011). *ICT and the management of education in Nigeria.* COEWA publishing unit.

Ofodu, G.O. (2007). Nigeria literacy educators and their technological needs in a digital age. *Education focus* 1(1), 22–30.

Onokala, B. (2021). Effects of Computer-Assisted Instruction (CIA) with Drill and practice on Academic Achievement of students in Physics. *Nig. J. Science and Science Edu*, 8(2), 72 – 86

Tan, B., & Hsu, A. (2018). *Effects of information and communication technology preference on labour productivity*. University of Ilorin Press.

White, C. (2009). *The state of information and communication technology (ICT) in Nigerian university libraries.* http://www.unllib.uni.edu/LPP/womboh.html.