

AVAILABILITY AND APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY FOR EDUCATIONAL RESEARCH IN THE POST-COVID-19 ERA

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Abstract

The paper is centred on availability and application of information and communication technology for educational research in the post-COVID-19 era. A descriptive survey research design was employed for the study. The study was carried out at two tertiary institutions in Rivers State with 84 final year students (45 males and 39 females) in the department of computer education. Three research questions guided the study, with two hypotheses formulated and tested at a 0.05 level of significance. The instruments used for data collection were a checklist of computer peripheral devices and a questionnaire. The reliability coefficients were obtained through Cronbach Alpha, with values of 0.82, 0.80 and 0.86 for different sections of the instruments. A simple percentage rating was used to ascertain the availability of items in research question one. The mean and standard deviation were used to analyse research questions two and three, while the hypothesis was tested with z-test statistics. The major finding showed that the application of information and communication technology in educational research after the COVID-19 pandemic was high. Associated with these findings were the online programmes going on as a result of the COVID-19 lockdown restriction in tertiary institutions. It was recommended that awareness programmes on ICT tools and their applications in educational research should be made compulsory for students. Also, ICT tools should be made available and accessible to students in order to avoid crowding in school programs.

Keywords: *Applications, Computer peripheral device, Covid-19, Educational research.*

Introduction

The global COVID-19 epidemic has had massive institutional and behavioural shock consequences in many sectors of human activity, including education. From 2020 until the present, its impact on students in academic institutions has been unprecedented (Adedoyin & Soykan, 2020). It has affected people regardless of nationality, level of education, income, or gender. The COVID-19 epidemic has also had a significant influence on higher education with colleges and universities closing their doors and governments closing their borders in reaction to lockdown measures. Some higher education institutions were quick to replace face-to-face lectures with online learning, where computers and other information and technology devices are used in teaching and learning as well as educational research (García-Peñalvo et al., 2021; Rashid & Yadav, 2020). Students from privileged backgrounds, supported by their parents, are able to learn through alternative routes (*via* ICT) even at closed doors, whereas those from

Cite this article as

Orie, M. J. (2022). Availability and application of Information and communication Technology for educational research in the post covid-19 era. *THE COLLOQUIUM*, 10(1), 39-48

disadvantaged backgrounds often remain shut out when their schools shut down (Brotto et al., 2021; Lawal et al., 2022).

The development of contemporary technology known as computers in the last several decades has enabled the globe to make significant advances in the storage and analysis of information. Any device that is linked internally or externally to a computer and is employed in the transportation of data to or from a computer is referred to as a computer peripheral device (Orie, 2013). According to Larionov et al., (2005), a computer is an electronic device that is configured to receive data, process the data, and then output the outcome of the processing. In the same light, Edefiogo (2007) described a computer as an electronic circuit used for automatically storing and interpreting information. A computer is an electronic machine that operates under the direction of information encoded in its own memory and can take input, change the data according to set rules, create results, and store the results for later utilization. According to Anigbo and Orie (2018), a computer performs three basic functions: accepting data (input), processing data, and producing information (results) (output). A computer employs hardware and software to convert data into information. The electrical and mechanical components that comprise a computer are referred to as "hardware." Software is a set of instructions that tell hardware how to accomplish certain tasks. Furthermore, computers come with a variety of features, such as the internet, software printer, scanner, intranet, etc. These features are known as computer peripherals devices and contribute to the effectiveness of the computer in some manner. Computers are utilised in the classroom *via* Computer Aided Instruction (CAI), computer animation and simulation, distant learning, assignments, and research. Other applications of computers in schools include administrative and clerical duties such as enrolling students, keeping data, issuing report cards, fixing scheduling issues, etc. (Taylor et al., 2007; Sin & Al-Asmari, 2018). Nwankwo (2013) defines research as "the methodical and rational pursuit of answers or solutions to questions asked concerning observable situations, processes, or events in the environment." It is a method used by instructors to solve educational challenges. According to Harrison et al., (2010), educational research is the formal methodical adaptation of the scientific method to the investigation of educational problems. some of the stages involved in educational research include; identification and statement of the problem, reviewing the literature, providing research questions, designing the study, collection of data, analysis of data, drawing conclusion and writing of report. This research method adopted by students and lecturers makes computers very necessary for both students and lecturers in colleges of education who are saddled with the responsibility of research work such as assignments, seminars, dissertations, and theses (Lodico et al., 2010). Orie (2013) explains that computers are used in the conceptual, design and planning, data collection, data analysis, and research publication phases. Also, Ogunji (2013) posits that the field of education has been affected by computers, which have undoubtedly affected teaching, learning, and research.

Despite the enormous contributions of computers to educational research, some colleges of education in Nigeria still do not have these devices in their libraries and resource centres, and some of the schools that do have these devices are not connected to the internet for easy access to information for research, or the power required for their operation is not consistent. According to Okwudishu (2005), inadequate search abilities and an inability to access or use the internet by instructors and students are to blame for bad computer application in research. Despite the fact that some schools have a large number of these gadgets, some kids prefer to do their homework outside the school. Essentially, these students employ specialists from outside the school premises to assist them in obtaining information for their research

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assignments. Agbetuyi and Oluwatayo (2012) studied computer use and its relation to classroom instruction in the Nigerian education system. Adomi and Kpangban (2010) explored the use of the internet and computers in chemistry education research in Nigerian tertiary institutions: challenges and approaches for advancement in more current work. The educational sector has been affected by the outbreak of COVID-19. However, computers and their peripheral devices have become very helpful to teachers and students, making the teaching-learning process easier. In education, ICT plays a vital role in facilitating teaching and learning. They have transformed classroom communication methods and modified instruction strategies. This paper is centred on the computer peripheral devices available, how often they are applied in educational research, and the factors responsible for the poor application of the ICT tools in Rivers State after the COVID-19.

Research Questions

- i. What are the ICT tools available for educational research in tertiary institutions in Rivers State after COVID-19?
- ii. How often are the available ICT tools in the tertiary institutions in Rivers State used for educational research after COVID-19?
- iii. What are the factors responsible for the poor application of available ICT tools in tertiary institutions in Rivers State for educational research after COVID-19?

Hypotheses

H₀₁ : There is no significant difference between the mean responses of male and female students on the application of the available ICT tools in tertiary institutions in Rivers State for educational research after COVID-19.

H₀₂ : There is no significant difference between the mean response of male and female students on the factors responsible for the poor utilization of available ICT tools at the tertiary institutions in Rivers State for educational research after COVID-19.

Methodology

A descriptive survey design was used to carry out the study in some selected tertiary institutions in Rivers State. The study was conducted within one state and one federal selected tertiary institution offering computer education in Rivers State, which included Ignatius Ajuru University of Education, Port Harcourt, and the Federal College of Education (Technical), Omoku. The sampled population of the study was 84 students selected from the departments of computer education (45 males and 39 females). Due to the small population size, there was no sampling since the population was considered manageable and hence no sampling technique was used. The instruments for data collection were a 38 item structured questionnaire and a checklist with 20 computer peripheral devices. The reliability of the instrument was determined by administering the questionnaire to 15 computer education students from the Department of Mathematics & Computer Education, Enugu State University of Science & Technology, Enugu State. A reliability coefficient of 0.82, 0.80, and 0.86 were obtained through Cronbach Alpha for different sections of the instrument. Research question one was a checklist of ICT tools used by students. Items with a percentage of 50% or higher were deemed available, while those with a percentage of less than 50% were deemed unavailable. The research question 2 was analysed with the following range of numbers: strongly applied (SA) (4.5-5.00), applied (A) (3.50-4.49), moderately applied (MA)(2.5-3.49), lowly applied (LA) (1.50–2.49) and very low applied (VLA) (0.50-1.49), respectively. Research question 3 was designed in the pattern of the Likert-5- point rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree

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(D), and Strongly Disagree (SD) with the assigned numerical values of 5, 4, 3, 2, and 1 respectively. Any item with a calculated mean value of equal to or greater than 3.00 was accepted, while any item with a mean value of less than 3.00 was rejected. For tests of hypotheses, the z-test is adopted in this study because, as the sample size becomes sufficiently large, the t-distribution coincides with the z-distribution (Nworgu, 2015; Nwankwo, 2013). If the calculated value of z (z-cal) is less than the critical value of z (z-critical), the hypothesis is accepted. But if the calculated value of z (z-cal) is greater than or equal to the critical value of z (z-crit), the hypothesis is rejected. The Statistical Package for Social Science (SPSS) and Microsoft Excel software were used to analyse the data.

Results and Discussion

Research Question 1

What are the ICT tools available for educational research in tertiary institutions in Rivers State?

Table 1: Students' response on computer tools available for educational research in tertiary institutions in Rivers State

S/No	Available Tool	No. Available	%	RMK	S/no	Available Tool	No. Available	%	RMK
1	Desktop	62	71	A	14	Printing Paper	63	75	A
2	Laptop	46	55	A	15	Software App	45	84	A
3	Palmtop	36	43	A	16	Digital camera	46	54	A
4	Printer	48	75	A	17	Pen Drive	39	46	A
5	Scanner	24	29	NA	18	Video game	51	61	A
6	Internet	72	86	A	19	Interactive white board	49	58	A
7	Projector	61	73	A	20	Microphone	33	39	NA
8	Photocopier	67	80	A	21	JSTOR	20	24	NA
9	Computer Lab	53	63	A	22	Grammarly	50	59	A
10	DVD/CD	58	69	A	23	Turnitin	45	54	A
11	Modem	59	70	A	24	Quillbot	25	30	NA
12	Satellite Receiver	21	25	NA	25	EndNote	29	35	NA
13	Flash Drive	58	69	A	26	SPSS/MES	50	60	A

Source: Researchers' Field Work; 2022; A=Available, NA=Non-Available

Table 1 contains the lists of the 26 ICT tools used in this research. 75% of the ICT tools were considered available and confirmed by students from the tertiary institutions in Rivers State. This is based on the percentage of availability of 50% and above. The percentages of ICT tools available in these institutions after the COVID-19 were better when compared with the ICT facilities before the COVID-19. The findings were consistent with Anigbo (2016), who confirmed the availability of 50% of computer facilities, and Deebom et al., (2018), who used the same percentage rating to ascertain the utilisation of ICT tools available in some selected tertiary institutions.

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Research Question 2

How often are the available ICT tools in tertiary institutions in Rivers State used for educational research?

Table 2: Student responses on the application of computer peripheral device for educational research in tertiary institutions in Rivers

S/N	Available Tool	Mean	SD	RMK	S/no	Available Tool	Mean	SD	RMK
1	Desktop	2.95	1.35	LA	14	Printing Paper	3.20	0.73	MA
2	Laptop	3.90	1.07	A	15	Software App	3.27	1.07	MA
3	Palmtop	1.80	0.64	LA	16	Digital camera	4.12	1.09	A
4	Printer	2.45	0.75	LA	17	Pen Drive	2.75	1.14	MA
5	Scanner	2.21	1.19	LA	18	Video game	2.42	1.17	LA
6	Internet	4.21	1.38	A	19	Interactive white board	2.15	1.10	LA
7	Projector	2.33	1.22	LA	20	Microphone	2.61	1.17	LA
8	Photocopier	3.10	1.08	MA	21	JSTOR	2.20	0.67	LA
9	Computer Lab	3.52	1.09	A	22	Grammarly	2.38	0.98	LA
10	DVD/CD	3.35	1.25	MA	23	Turnitin	1.98	0.57	LA
11	Moderm	3.99	1.29	A	24	Quillbot	2.02	0.49	LA
12	Satellite Receiver	3.10	1.45	MA	25	EndNote	1.60	0.31	LA
13	Flash Drive	2.90	0.96	LA	26	SPSS	2.52	0.47	LA

Source: Researchers' Field Work; 2022; SA=Strongly Applied, A=Applied, MA=Moderate Applied, LA=Lowly Applied, UA=Un-Applied

Table 2 shows the levels at which the students of tertiary institutions applied some ICT tools in educational research. The result shows that 15% of the ICT tool were at level of applied, on the basis that they have the mean values with the of 3.50-4.49, 23% of the ICT tools were moderately applied (2.5-3.49), and other ICT tools used for educational research were lowly applied(1.50–2.49) by research students in tertiary institutions in Rivers State, with a percentage response of 58%. Corroborated with the findings was the estimation of Ogunji (2013) on the levels of utilisation of computer facilities before COVID-19. About 75% of the ICT tools were underutilised based on free restrictions on the number of students that were expected to converge in classrooms. The research also revealed that the internet, projector, satellite, computer laboratory, software apps, and digital cameras were mostly used, and this could be attributed to online lectures and restrictions on the number of students in a classroom during the lockdown and after the pandemic. This is in conformity with the views of Brotto et al., (2021) and Abubakar (2011), who posited that in many parts of the world, micro-computers had invaded the classroom and had recorded a positive impact on the learners. The available PCs in the computer laboratory are, however, inadequate for meeting the needs of students.

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Research Question 3

What are the factors responsible for poor application of computer ICT tools in tertiary institutions in Rivers State for educational research?

Table 3: Student responses on factors responsible for poor application of ICT tools for educational research in tertiary institutions in Rivers

		Response from Student		
		Mean	SD	RMK
1	Potential Factors			
2	Frequent power disruption	3.20	1.19	AC
3	Inadequate knowledge of computer usage	3.67	1.31	AC
4	Employees' nasty disposition to student	3.38	1.14	AC
5	Students' inability to access computer facilities	3.78	1.09	AC
6	Incomplete computer peripherals device	3.47	1.04	AC
7	Students' disinterest in computer applications	3.11	0.83	AC
8	Students' negative impression of computers	3.04	1.07	AC
9	Malfunctioning computer peripherals device	2.67	1.51	RJ
10	No internet service	2.92	1.26	RJ
11	Students' inability to do independent research	4.29	1.38	AC
12	Slow internet connection	3.24	1.23	AC
13	Students' lack of relevant search skills	2.75	0.85	RJ
	Total	3.27	1.15	AC

Source: Researchers' Field Work; 2022, AC= Accepted; RJ= Rejected

Table 3 reveals the potential factors responsible for the poor application of some ICT tools in educational research in the tertiary institutions in Rivers State. Some of the items are highly accepted based on 3.0 and above acceptance. This conforms to the assertion of Okwudishu (2005), who asserts that students' inability to do independent research and inadequate knowledge of computer usage by students are responsible for the under-usage of computer peripheral devices in educational research. The factors accepted that could not be attributed to the pandemic, however, has been a challenge to educational research in tertiary schools in Rivers State and Nigeria as a country. Orie et al., (2013) identified frequent power outages and a lack of computer knowledge as some of the impediments to ICT implementation in South-South Nigeria. Consistent with this view were the assertions of Lodico et al., (2010) on the adoption of ICT as a common means of disseminating knowledge in tertiary institutions as a way of meeting common 21st century educational challenges.

Hypothesis 1

H₀₁: There is no significant difference between the mean responses of male and female students on the application of the available ICT tools in tertiary institutions in Rivers State for educational research. Data for testing hypothesis H₀₁ is presented in table 4.

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Table 4: z-Test Analysis on Application of available ICT tools for educational research in tertiary institutions in Rivers State

Group	Mean	SD	N	df	z-cal	z-crit	Decision
Male student	2.76	1.11	45	82	1.30	3.45	Accepted
Female student	3.11	0.64	39				

Source: Researchers' Field Work; 2022

Table 4 shows the z-test analysis on the application of available ICT tools in tertiary institutions in Rivers State. The result shows that the critical value is higher than the z calculated value. This implies that there is no significant difference in the mean response of male and female students on the application of the available ICT tools used for educational research in tertiary institutions in Rivers State after COVID-19. The acceptance of the null hypothesis was corroborated by the findings of Abubakar (2011) and Ogunji (2013) that emphasised the importance of ICT on instructional delivery in classrooms.

Hypothesis 2

There is no significant difference between the mean response of male and female students on the factors responsible for poor applications of the available computer peripheral device for educational research in tertiary institutions in Rivers State.

Table 5: z-test Analysis on factors responsible for poor application of available ICT tools for educational research in tertiary institutions in Rivers State

Group	Mean	SD	N	df	z-cal	z-crit	Decision
Male student	3.13	0.71	45	82	0.73	1.960	Accepted
Female student	3.67	0.80	39				

Source: Researchers' Field Work; 2022

Table 5 shows the z-test analysis on the factors responsible for poor application of the available ICT tools in tertiary institutions in Rivers State. The null hypothesis was accepted on the basis that the calculated z-value is less than the z-critical value. The study agreed with the findings of Haliso (2011) and Abubakar (2011).

Conclusion

The paper reports on availability and application of information and communication technology for educational research in the post-COVID-19 era. The findings reveal some of the ICT tools available, their level of application and the factors responsible for their under-application. Some of the factors undermining the application of ICT tools in educational research are frequent power disruption, students' inability to access computer facilities and also do independent research, etc. The research revealed that many students in tertiary

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institutions made use of ICT tools during and after the pandemic in their educational research. This is associated with the COVID-19 restriction and the embracement of on-line programmes as an alternative means of teaching and learning, presentation, meetings, and educational research. It is pertinent to conclude that information and communication technology played a huge role in educational research during and after the COVID-19 pandemic. However, the availability of computers for research in schools today has not prevented students from using the old method of sourcing for information or contracting the process of sourcing for relevant information during research to computer operators outside their schools. This is as a result of persistent power failures, a lack of appropriate search skills, and the negative attitude of the staff of school ICT centres.

Recommendations

The following recommendations were made based on the findings;

- i. There should be proper awareness of the importance of the use of ICT tools in educational research and other school activities in tertiary institutions in Rivers State. It should be made mandatory for every level of programme in order to avoid crowding in school premises.
- ii. ICT tools should be made available and accessible to students. This will enable them to acquaint themselves with the usage.
- iii. Electricity supply to every ICT centre in tertiary institutions in Rivers State should be separated from other areas of the school. This is to ensure that steady power is supplied regularly.

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