LEVERAGING INFORMATION AND COMMUNICATION TECHNOLOGY FOR EFFECTIVE INSTRUCTIONAL DELIVERY IN ADULT EDUCATION IN CROSS RIVER STATE, NIGERIA

Olofu, Paul Agbade (Ph. D.); Nkanga, Itorobong Inem & Adigeb, Emmanuel Agim
Department of Continuing Education and Development Studies
Faculty of Vocational and Entrepreneurial Education
University of Calabar

&
Ogar Martina Ogbene
Department of Guidance and Counseling
University of Calabar

Corresponding email: paulagbade@gmail.com **GSM:** 08074146153

Abstract
This study centered on leveraging on information and communication technology for effective instructional delivery in adult education in Cross River State, Nigeria. The purpose of the study was to examine the relationship between ICT usage and effective teaching and learning of adult education in Cross River State, Nigeria. The study also ascertained the extent to which ICT facilities are available and adequate in adult literacy centers in Cross River State, Nigeria. The research design adopted for this study was descriptive survey. The population of the study comprised nine hundred and eighty-four (984) adult learners in twenty-four (24) adult literacy centers in Cross River State, Nigeria. The sample of the study was made up of 382 adult learners in the twenty-four (24) adult literacy centers. The study adopted stratified, simple random and proportionate sampling techniques to select the sample of the study. The instruments used for data collection were checklist and questionnaire. Data gathered were analyzed with mean and Pearson Product Moment Correlation Coefficient (PPMCC). The finding of the study revealed that most of the ICT resources needed for teaching and learning of adult education in adult literacy centers in Cross River State are not available for use. Result also showed that majority of the modern ICT resources needed for teaching and learning of adult education are not adequate in adult literacy centers in Cross River State, Nigeria. The outcome of the study further indicated that there is significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria. The study therefore, recommended among others that; Cross River State Government and its relevant agencies should see the urgent need to provide adult literacy centers with modern ICT facilities and equip adult facilitators with the requisite technical know-how on the usage of the facilities.

Keywords: Information and Communication Technology, Instructional Delivery, Adult Education.

Introduction
Adult education can be seen as any form of learning activity that is organized for adults to improve themselves in terms of knowledge, skills, values and experiences among others. It can also be defined as any form of educational programme which is designed for adult learners in order to enable them acquire relevant knowledge, skills, values or experience;

thereby making them relevant to themselves and the society at large. According to Guesson (2021), adult education refers to the education which is provided for people considered as adults by their community. Wilson (2022) conceived adult education to consist of all forms of educational experiences needed by men and women according to their varying interests and requirements at their differing levels of comprehension and ability and in their changing roles and responsibility throughout life. In the view of Gambo (2023), adult education is an all-inclusive education with a variety of learning activities which are organized for adults to improve themselves, their families and communities. It is a process where adults who are no longer in school or do not attend school on a regular or full time basis or school dropouts undertake sequential (chronological) and organized educational activities on various subjects, such as health and family welfare, agriculture and animal husbandry etc.

Adult education as an educational process is set out to achieve various objectives. According to Akinoji (2024), the primary purpose of adult education is to provide a second chance for people who are poor in the society or those who had lost access to formal education in order to achieve social justice and equal access to education. As stated by Emmanuel (2023), the objectives of adult education are to develop basic education skills (such as literacy and numeracy); develop new vocational skills and expertise to adapt to changing labour market conditions; continue learning for personal development and leisure. Hence, adult education seeks to increase the quality of life of an individual and unable him/her to realize his/her potential for self-realization; to raise the standard of living of the families, communities, societies and nations; to promote peace and communal harmony in the multi-cultural global village as well as to enhance the pace of development and welfare of the individual, nations and international community as whole (Okri et. al, 2020; Ibu et. al., 2019; Bessong, et al, 2024).

Adult education is very critical to every society and tends to play pivotal role in socio-economic, political, cultural, religious and sustainable development of a nation. Irrespective of its forms and patterns, adult education according to Ajimobi (2023), promotes poverty reduction and improvement of human capital through knowledge acquisition, development of social consciousness in the learners. It empowers individuals by improving their literacy and technical skills. This, in turn, enhances workforce productivity and economic growth. Furthermore, adult education promotes social inclusion and reduces inequality. It also provides opportunities for lifelong learning and personal development

Therefore, the extent to which the aims and objectives of adult education as highlighted above among others can be maximally attained and sustained in the 21st century in Nigeria may be dependent on the availability, adequacy and sagacious utilization of information and communication technology (ICT) facilities in the teaching and learning adult education. Repositioning the teaching and learning of adult education in the 21st century through integration of information and communication technology is even more needed now as a result of the rapidly ever-changing technological and increasing competitiveness and globalization which suggest that better education is very essential for individual survival and livelihood as well as national sustainable development.

Statement of the problem

No doubt, the application of information and communication technology in teaching and learning of adult education connects both teachers and students to a vast array of global stock of knowledge; thereby providing interactive, participative, regenerative and quality education. However, a whole lot adult literacy schools in Cross River State, Nigeria may not have modern ICT facilities to be used for teaching and learning. In some adult literacy schools where there are few ICT facilities, the available ones may be inadequate and dysfunctional. Even the few ones available, some adult facilitators may rarely used them for

teaching; as some of the facilitators are not ICT compliant. This goes a long way depriving adult learners from global stock of knowledge and benefitting from the diverse and enormous importance of using ICT facilities. This problem is also acknowledged by Okafor (2023) who maintained that the availability and adequacy of ICT facilities in most schools in Nigeria is a serious challenge.

It is in realization of the above problem that this research work has become very necessary to ascertain the extent to which ICT facilities are available and adequate for teaching and learning of adult education in the 21st century in Cross River State, Nigeria.

Purpose of the study

The main purpose of this study was to ascertain how information and communication technology can be leveraged to enhance effective instructional delivery in adult education. Specifically, the study sought to:

i. determine the extent to which ICT resources are available for teaching and learning of adult education in Cross River State, Nigeria.
ii. ascertain the extent to which ICT resources are adequate for teaching and learning of adult education in Cross River State, Nigeria.
iii. examine the relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria.

Research questions

In line with the purpose of this study as outlined above, the following corresponding research questions were formulated to guide this study:

i. To what extent are ICT resources available for teaching and learning of adult education in Cross River State, Nigeria?
ii. To what extent are ICT resources adequate for teaching and learning of adult education in Cross River State, Nigeria?
iii. What is the relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria?

Research hypothesis

Based on the research questions, one null hypothesis was developed to guide the study as thus.

i. There is no significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria.

In terms of organization of this work, this paper is organized under the following subheadings: literature review, theoretical framework, method, results, discussion of findings, conclusion, recommendations, acknowledgements and references.

Literature Review

This section reviewed different literatures of scholars which are related the present study. Thus, this section explicitly explicated the concept of information and communication technology as perceived by different scholars. Also reviewed herein was the extent to which ICT resources are available and adequate for teaching and learning of adult education in Cross River State, Nigeria. The relationship between ICT usage and effective teaching and learning of adult education was examined.

The concept of information and communication technology simply refers to an extended term for information technology that emphasizes on the role of unified communications and the

integration of telecommunications, computer and all the necessary enterprise software, middle wares, storage and audio-visual systems (Opara et al, 2020, Ihekoronye et al, 2020). According to Olaniyi (2023), the concept of ICT refers to the act of combining audio-visual and telephone networks with computer networks via a single link system; with a view to helping users process, convey, manipulate and use reliable information. Hence, ICT is an umbrella word which connotes any communication devices or application that encompasses radio, television, cellular, computer and network hardware and software, satellites systems and the various services and applications associated with them such as conferencing.

Information and communication technology can be defined as the process whereby computer and its equipment as well as other technology-related apparatus are used in order to enable users process, store, transmit access and manipulate information through electronic gadgets. In the same vein, Bansal (2021) see information and communication technology as the technologies which are employed or used to convey, manipulate and store data by electronic means (Ibu et. al., 2019; Inyang et. al, 2020; Effiong & Olofu, 2016; Niyi & Olofu, 2023).

Perron (2020) pinpointed examples of ICT resources to includes all the different computing devices (e.g computers, smart phones, photocopy machines, data projectors, interactive whiteboards, word processing, internet, digital cameras, CD/DVD players, radios and tape recorders, e-mail, SMS text messaging, video chat and online social media etc) that carry out a wide range of communication and information functions (Effiong & Olofu**,** 2018). Kaware and Sain (2022) defined information and communication technology as a combination of devices and technology resources, which are used to manipulate and convey information. In the view of Techterms (2023), ICT encompasses all the technologies that provide access to information through telecommunications. Examples include internet, wireless networks, cell phones and other communication mediums.

To what extent are ICT facilities availability and adequacy for teaching and learning of adult education in Nigeria? Beyond ICT facilities' usage having significant positive impact on the teaching and learning of adult education, one wonders the extent to which ICT facilities are available and adequate for use in adult literacy centers and institutions in Cross River State, Nigeria. Okoro (2022) while commenting on the availability of ICT resources in Nigerian institutions of learning; observed that Nigeria is yet to fully embrace the use of ICT for teaching and learning. Okoro added that there several institutions of learning in Nigeria that are yet to have modern ICT facilities; as most teachers in Nigeria are still use to the traditional chalk-board method of teaching (Olofu et al, 2024; Olofu et al, 2019; Olofu et al, 2023).

Similarly, Strudler (2021) and Bessong et al (2024), maintained that the availability of ICT resources is more pronounced in developed nations when compared with under-developed and developing nations. In the same vein, Lawal (2023) argued that a few educational institutions in Nigeria are known to have ICT facilities such as CD-ROM, computer, scanner and printer etc. According to Orji (2020), there are no ICT facilities in most Nigerian schools. Statistically, a study carried out by Okoboh (2023) indicated availability of only 7.7% ICT facilities in public schools and 29.8% of teachers who can access the internet without assistance. Chukwu (2023) reported that the non-availability of ICT facilities in sufficient quantity in Nigerian schools, from primary to tertiary levels affects teaching and learning. According to Nwosu (2024), 50% of Nigerian schools, have no ICT facilities but computer is mainly for administrative purpose and no teacher uses computer to teach.

As to the adequacy of ICT facilities for teaching and learning, Ngwu (2024) indicated that most ICT resources or facilities are not available in Nigerian schools. This according to Ngwu, implies that even though teachers are willing to make use of ICT facilities to teach

students, they are blocked from doing so by the lack of technological equipment and facilities. Similarly, Egomo, Enyi and Tah (2022) revealed that the availability of ICT tools for effective instructional delivery is relatively very low except for laptops, multimedia projectors and internet facilities which are found in some schools located in cities. Egomo, Enyi and Tah went on to argue that this affects the quality of students produced from Nigerian institutions.

Samuel and Bakar (2020) posited that there is lack of technology-based infrastructural facilities in many schools in Nigeria especially in rural areas and has indeed caused poor ICT integration in schools. Samuel and Bakar, added that there are insufficient or limited computer facilities for teachers; as no central databases are used and no learning management systems are available for purposes of electronic learning. Samuel and Bakar, also revealed that there is insufficient staff training of teachers resulting in poor ICT integration. Similarly, Aduwa-Ogiegbaen and Myamu (2021) observed that most public schools in Nigeria do not have adequate ICT facilities to facilitate teaching and learning. In the view of Aduwa-Ogiegbaen and Myamu, this has made computer is not part of classroom technology in more than ninety (90) percent of Nigerian public schools. Thus, the chalkboard and textbook has continued to dominate classroom activities in most Nigerian secondary schools (, Paul et. al, 2019; Ebele & Olofu, 2020; Niyi & Olofu, 2024).

Writing on the availability and adequacy of ICT facilities for teaching and learning in schools, Ebele and Olofu (2020) and Okpala (2022) posited that Information Communications Technology (ICT) has become an integral part of education world over but a lot of schools are yet to adequate access and utilized ICT facilities in reasonable proportion. They further state that most institutions of learning are still lagging behind when it comes to the availability and adequacy of ICT facilities for teaching-learning process. This situation in their opinion is more pathetic in schools located in rural areas. Some of the factors responsible for the inadequacy and availability of ICT according to Okpala include-lack of power supply, insufficient resources, fear of technology, lack of interest, ICT skills deficiency, higher ICT cost and poor physical infrastructure (Essang, 2025, Essang, 2025).
Empirically, Bisi (2023) carried out a study on the availability and adequacy of ICT facilities in Nigerian schools. The findings revealed that government owned institutions of learning in Nigeria have limited ICT resources compared to private institutions. Similarly, Martins (20222) undertook a study on the extent of availability and utilization of ICT resources in Nigerian schools. The outcome of the study indicated that most ICT facilities are not being used for teaching and learning in schools; as most modern ICT facilities are not available. Ola (2021) and Olofu, Bessong and Victor (2024) acknowledged poor government commitment toward the provision of ICT facilities in Nigerian schools. Ola stressed that most schools in Nigeria do not have in sufficient quantity the needed modern ICT facilities that could help the learners benefit from global interaction and having easy access to relevant information when needed.

What is the relationship between ICT application and the teaching and learning of adult education in Nigeria? The application of ICT in the teaching and learning of adult education in particular and education in general, has the capacity to positively reposition and reshape its instructional contents, delivery, facilitators, learners/outputs. Corroboratively, Shear and Knobrel (2023) maintained that ICT has positively affected all aspects of the education sector and its curricula; as it improves students' learning by changing the way teachers teach and the structure of their pedagogies. It also empowers students to develop new ways of thinking and being creative in learning. Using ICT, students can plan and build models and use internet to bring a new dimension to their learning.

Stressing on the relevance of ICT integration in education (adult education inclusive), Volman and Van-Eck (2021) maintained that effective use of ICT creates a powerful learning

environment and transforms teaching-learning process in which students deal with knowledge in an active, self-directed and constructive way. In the same vein, Okpala (2022) noted that the use ICT resources in teaching and learning reduces verbalization, stimulates self-activity, makes learning attractive and interesting, concretizes basic conceptual thinking, increases students' retention level as well as fosters creative imagination. Coates (2024) admitted that students who are taught using ICT facilities have the tendency to score better/higher than their counterparts that are taught without ICT facilities. Coates therefore, submitted that ICT especially computers and Internet technologies enable new ways of teaching and learning rather than simply allowing teachers to engage the students in abstract learning. ICT helps in providing a catalyst for rethinking teaching practice and developing the kind of graduates and citizens required in an information society.

Butcher (2019) posited that ICT has lot of effect on teachers and students' activities in school; as it improves poor handwriting and languages skills through word processing; equalizes individual differences and has particularly dramatic effects for students with special needs; facilitates self-pacing with increased capacities to deal with individual learning styles as students can work at the pace and intensity suitable to their needs; enables collaborative learning with little indication of the isolated learner; encourages use of peer coaching and peer reviews as well as develops communication skills and awareness of different audiences.
According to Peter (2020), the economic rationale of ICT in education relates to potential increase in efficiency and effectiveness of educational tasks, which eventually results in labour saving costs. On the other hand, pedagogic rationale emphasizes on the contribution which ICT has in terms of improvement of the quality of education by providing rich, exciting, motivating and new environments for learning. Cohen (2023) observed that the use of ICT in education makes teaching and learning of adult education more practical, active-based, creative, participative, constructive and interesting to both the teachers and learners.
Ike (2012) believes that ICT facilities when being properly used, inculcate in the learners' science process skills, laws that determine the structure of the universe with reference to the matter and energy in the universe. Onwuka (2021) stated that ICT resources when effectively used tends to enhance teaching and learning in all ramifications.

Methodology

The research design adopted for this study was descriptive survey. The design was considered most appropriate and chosen because it allows the researcher to gather data from representative sample of the larger population and allows for generalization of the findings to the larger population. The population of the study comprised all the nine hundred and eighty-four (984) adult learners in twenty-four (24) adult literacy centers in Cross River State, Nigeria. The sample of the study was made up of 382 adult learners in the twenty-four (24) adult literacy centers. The study adopted stratified, simple random and proportionate sampling techniques to select the sample of the study. First, stratified sampling technique was used to categorize or group the literacy centers in three (3) education zones (Ogoja, Ikom and Calabar) as already structured for political and administrative purpose. Thereafter, random sampling technique was used to select to select 24 adult literacy centers (8 literacy centers per education zone). Finally, ten percent (10%) proportionate sampling was used to select adult learners from each of the 24 literacy centers selected for the study. The instruments used for data collection were checklist and questionnaire. The checklist was used to collect data on the extent of availability and adequacy of ICT facilities in adult literacy centers in Cross River State, Nigeria. The response options for the checklist on availability of ICT facilities were: A (Available) and NA (Not Available). As for adequacy of ICT facilities, the response options were: VA (Very Adequate), A (Adequate), I (Inadequate) and VI (Very Adequate). The questionnaire on the other hand, was used to elicit data on the relationship between ICT

facilities usage and teaching and learning of adult education in Cross River State, Nigeria. The questionnaire was structured in a closed-ended form and the response options were designed in a modified 4-likert scale of SA (Strongly Agree), A (Agree), D (Disagree) and SD (Strongly Disagree). Data gathered were analysed with mean and Pearson Product Moment Correlation Coefficient (PPMCC). While mean was used to answer the research questions, Pearson Product Moment Correlation Coefficient was used to test the hypothesis at 0.05 level of significance.

Result

Research Question One: To what extent are ICT resources available for teaching and learning of adult education in Cross River State, Nigeria?

Table 1: *Mean Score Analysis on the Extent of Availability of ICT Resources for Teaching and Learning of Adult Education in Cross River State, Nigeria*

S/N	Items	Mean	Std Deviation	Decision
1.	Desktop/computers	2.84	1.439	Available
2.	Laptop	2.90	1.518	Available
3.	Internet connectivity	2.19	1.194	Not Available
4.	Projectors	2.18	1.365	Not Available
5	Slide projector	2.28	1.366	Not Available
6.	Power point multimedia projector	2.17	0.876	Not Available
7.	Overhead projector & transparencies	2.26	0.765	Not Available
8.	Opaque projector	2.46	1.843	Not Available
9.	Projection screen	2.05	1.762	Not Available
10.	Television set	2.83	1.456	Available
11.	Computer laboratory	2.44	0.821	Not Available
12.	Software	2.29	1.258	Not Available
13.	Scanner	2.55	1.786	Available
14.	ICT resource centre	2.57	1.301	Available
15.	Internet facilities	2.27	1.564	Not Available
16.	Tape recorder	2.46	1.543	Not Available
17.	Video tape player	2.37	0.122	Not Available
18.	Audio-visual	2.41	1.234	Not Available
19.	Digital video cameras	2.38	0.678	Not Available
20.	Storage facilities	2.49	0.567	Not Available
21.	Photocopy	2.87	0.763	Available
22.	Printer	2.92	1.335	Available
23.	School cyber café	2.17	1.242	Not Available
24.	Digital library	2.35	1.313	Not Available
25.	Institutional web site (www)	2.18	1.189	Not Available
26.	School e-mail address	2.46	1.777	Not Available
27.	Electronic Class Roll (ECR)	2.07	1.299	Not Available
28.	Examination Scoring Machine (ESM)	2.09	1.250	Not Available
29.	Internally produced education software	2.01	1.266	Not Available
30.	Computer networking (local area network/wide Area network)	2.07	1.139	Not Available
31.	Multimedia classrooms (Audio Visual	2.03	1.230	Not Available
32.	Centre)	2.25	1.096	Not Available
33.	Satellite dish for global information	2.18	1.117	Not Available
	Close Circuit Television (CCTV)	**2.36**	**1.23**	**Available**
	Sectional Mean/Std Deviation			

Data in table 1 ascertained the extent of availability of ICT resources for teaching and learning of adult education in Cross River State, Nigeria. To analyze the data, mean score was used. The decision rule or benchmark for accepting any item was a mean score of 2.5 and above and vice verse. The results showed that desktop/computers, laptop, television set, scanner, ICT resource centre, photocopy and printer were available in adult literacy centers for teaching and learning of adult education. However, majority of the ICT resources such as internet connectivity, projectors, slide projector, power point multimedia projector, overhead projector and transparencies, opaque projector, projection screen, computer laboratory, software, internet facilities, tape recorder, video tape player, audio-visual tools, digital video cameras, storage facilities, school cybercafé, digital library, institutional web site (www), school e-mail, electronic class roll (ECR), examination scoring machine (ESM), internally produced education software, computer networking (local area network/wide area network), multimedia classrooms, satellite dish for global information and close circuit television (CCTV) were not available.

Thus, since the sectional mean of 2.36 is less than 2.5, it implies that most of the ICT resources needed for teaching and learning of adult education in adult literacy centers are not available for use.

Research Question Two: To what extent are ICT resources adequate for teaching and learning of adult education in Cross River State, Nigeria?

Table 2: ***Mean Score Analysis on the Adequacy of ICT Resources for Teaching and Learning of Adult Education in Cross River State, Nigeria***

S/N	Items	Mean	Std Deviation	Decision
1.	Desktop/computers	2.92	1.020	Adequately Available
2.	Laptop	3.00	1.321	Adequately Available
3.	Internet connectivity	2.27	0.431	Not Adequate
4.	Projectors	2.14	1.671	Not Adequate
5	Slide projector	2.23	0.021	Not Adequate
6.	Power point multimedia projector	2.46	0.228	Not Adequate
7.	Overhead projector & transparencies	2.37	0.920	Not Adequate
8.	Opaque projector	2.44	0.955	Not Adequate
9.	Projection screen	2.18	0.878	Not Adequate
10.	Television set	2.89	0.945	Adequately Available
11.	Computer laboratory	2.16	0.063	Not Adequate
12.	Software	2.27	1.100	Not Adequate
13.	Scanner	2.55	1.123	Adequately Available
14.	ICT resource centre	2.51	1.299	Adequately Available
15.	Internet facilities	2.38	1.242	Not Adequate
16.	Tape recorder	2.17	1.439	Not Adequate
17.	Video tape player	2.39	1.543	Not Adequate
18.	Audio-visual	2.32	1.335	Not Adequate
19.	Digital video cameras	2.08	1.096	Not Adequate
20.	Storage facilities	2.09	1.131	Not Adequate
21.	Photocopy	2.89	1.076	Adequately Available
22.	Printer	2.87	0.432	Adequately Available
23.	School cyber café	2.44	0.202	Not Adequate
24.	Digital library	2.07	1.194	Not Adequate
25.	Institutional web site (www)	2.18	1.211	Not Adequate
26.	Department e-mail address	2.17	1.133	Not Adequate
27.	Electronic Class Roll (ECR)	2.01	1.692	Not Adequate
28.	Examination Scoring Machine (ESM)	2.06	1.115	Not Adequate
29.	Internally produced education software	2.10	1.189	Not Adequate
30.	Computer networking (local area network/wide Area network)	2.39	0.120	Not Adequate
31.	Multimedia classrooms (Audio Visual Centre)	2.35	0.531	Not Adequate
32.	Satellite dish for global information	2.26	1.424	Not Adequate
33.	Close Circuit Television (CCTV)	2.03	1.287	Not Adequate
	Sectional Mean/Std. Deviation	**2.35**	**0.911**	**Not Adequate**

Data in table 2 examined the extent to which ICT resources are adequate for teaching and learning of adult education in Cross River State, Nigeria. To analyze the data, mean score was used. The decision rule or benchmark for accepting any item was a mean score of 2.5 and above and vice verse. The results indicated that desktop/computers, laptop, television set, scanner, ICT resource center, photocopy and printer were adequately available for teaching and learning of adult education. On the other hand, majority of the ICT resources such as

internet connectivity, projectors, slide projector, power point multimedia projector, overhead projector & transparencies, opaque projector, projection screen, computer laboratory, software, internet facilities, tape recorder, video tape player, audio-visual, digital video cameras, storage facilities, school cybercafé, digital library, institutional web site (www), school e-mail address, electronic class roll, examination scoring machine, internally produced education software, computer networking (local area network/wide Area network), multimedia classrooms (Audio Visual Centre), satellite dish for global information and close circuit television were not adequately available.

Therefore, since the sectional mean of 2.35 is not up to 2.5, it can be inferred that majority of the modern ICT resources needed for teaching and learning of adult education are not adequate in adult literacy centers in Cross River State, Nigeria.

Testing of Hypothesis

H01: There is no significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria.

Table 3: *Pearson Product Moment Correlation Coefficient of ICT Utilization and Teaching and Learning of Adult Education*

Variable	$\bar{X}$	SD.	r-value	Sig.
ICT Utilization	18.22	2.98	0.480*	.000
Teaching and Learning of Adult Education	200		18.74	1.43

*Significant at .05, p-value = .000, df = = 198

Data in table 3 determined the relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria. To test the hypothesis, Pearson Product Moment Correlation Coefficient was adopted. The result of the analysis revealed that the calculated r-value is 0.480 while the p-value is .000. The decision rule states that when the calculated r-value is higher than the p-value, the null hypothesis should be rejected while the alternative should be accepted. As such, since the calculated r-value of 0.480 is greater than the p-value is .000, the null hypothesis which states that there is no significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria. is rejected. Thus, the finding implies that there is significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria.

Discussion of findings

The discussion of findings as contained herein was carried table by table based on each research question and hypothesis. Thus, data in table 1 ascertained the extent to which ICT resources are available for teaching and learning of adult education in Cross River State, Nigeria. The result of the study revealed that most of the ICT resources needed for teaching and learning of adult education in adult literacy centers in Cross River State are not available for use.

The above result corroborate with that of Nwosu (2024), who reported that 50% of Nigerian schools, have no ICT facilities except for computer which is mainly for administrative purpose and no teacher uses computer to teach. The study by Martins (20222) on the extent of availability and utilization of ICT resources in Nigerian schools; indicated that most ICT facilities are not being used for teaching and learning in schools; as most modern ICT facilities are not available. Okoro (2022) observed that several institutions of

learning in Nigeria that are yet to have modern ICT facilities; as most teachers in Nigeria are still use to the traditional chalk-board method of teaching. In the same vein, Strudler (2021) maintained that the availability of ICT resources is more pronounced in developed nations when compared with under-developed and developing nations. Lawal (2023) argued that a few educational institutions in Nigeria are known to have ICT facilities such as CD-ROM, computer, scanner and printer etc. According to Orji (2020), there are no ICT facilities in most Nigerian schools.

Data in table 2 examined the extent to which ICT resources are adequate for teaching and learning of adult education in Cross River State, Nigeria. The finding of the study indicated that majority of the modern ICT resources needed for teaching and learning of adult education are not adequate in adult literacy centers in Cross River State, Nigeria.

The finding above is in agreement with that of Bisi (2023) who carried out a study on the availability and adequacy of ICT facilities in Nigerian schools. The findings revealed that government owned institutions of learning in Nigeria have limited ICT resources compared to private institutions. Ola (2021) stressed that most schools in Nigeria do not adequately have the needed modern ICT facilities that could help the learners benefit from global interaction and having easy access to relevant information when needed. Chukwu (2023) posited that the non-availability of ICT facilities in sufficient quantity in Nigerian schools, from primary to tertiary levels affects teaching and learning.

Data in table 3 determined the relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria. The outcome of the study showed that there is significant relationship between ICT utilization and teaching and learning of adult education in Cross River State, Nigeria.

The result above is in line with that of Cohen (2023) who stated that the use of ICT in education makes teaching and learning of adult education more practical, active-based, creative, participative, constructive and interesting to both the teachers and learners. According to Ike (2022), ICT facilities when being properly used, inculcate in the learners' science process skills, laws that determine the structure of the universe with reference to the matter and energy in the universe. Shear and Knobrel (2023) maintained that ICT has positively affected all aspects of the education sector and its curricula; as it improves students' learning by changing the way teachers teach and the structure of their pedagogies. It also empowers students to develop new ways of thinking and being creative in learning. Using ICT, students can plan and build models and use internet to bring a new dimension to their learning. In the view of Volman and Van-Eck (2021), effective use of ICT in education creates a powerful learning environment and transforms teaching-learning process in which students deal with knowledge in an active, self-directed and constructive way. In the same vein, Okpala (2022) maintained that the use ICT resources in teaching and learning reduces verbalization, stimulates self-activity, makes learning attractive and interesting, concretizes basic conceptual thinking, increases students' retention level as well as fosters creative imagination.

Conclusion

Information and communication technology has permeated all aspect of human endeavors. Therefore, proper application of ICT in education goes a long way ensuring that the learners have unlimited access to information, knowledge and interaction with people across globe. It also reduces abstract teaching and learning as well as makes learning attractive, interesting and increases students' retention. As such, leveraging on information and technology will go a long way promoting effective teaching and learning of adult education in the 21st century in Nigeria.

Recommendations

In line with the findings of this study, the following recommendations were made:

i. Cross River State Government and its relevant agencies should see the urgent need to provide adult literacy centers with modern ICT facilities and equip adult facilitators with the requisite technical –know-how on the usage of the facilities. ii. Beyond mere provision of modern ICT facilities in adult literacy centers Cross River State, the facilities should be adequately provided in order to ensure that both adult learners and the facilitators have access to use them when the need arises. iii. Since proper use of ICT facilities enhances effective teaching and learning of adult education, the government at all levels and private organizations should collaborate in the provision of ICT in education.

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