

INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS ACQUISITION IN SCIENCE EDUCATION TEACHERS TRAINING PROGRAMME: IMPERATIVE FOR SELF-RELIANT

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Abstract

The study examined self-reliant through ICT skills acquisition in Science Education training programme in the two universities in Akwa Ibom State. Two research questions were formulated to guide the study. Descriptive survey research was adopted using a population of 4,162 comprises all Year Four Science Education students in the two universities in Akwa Ibom State. The sample of 300 registered students was randomly selected from the two universities in the State. An instrument titled Science Education Students ICT Skill Acquisition Questionnaire (SESISAQ) was used for data collection. The instrument was validated by two experts in Science Education in department of Science Education, Akwa Ibom State University, while the reliability coefficient of 0.75 was obtained using Cronbach's Alpha method. The data collected were analyzed using mean and standard deviation to answer the two research questions. The finding of the study revealed that the level of ICT skills acquisition of Science Education students during the training programme was low in major ICT areas such as Web page designing, cyber security, software installation, Website creation; graphic designing, Word Press usage, and ICT trouble shooting. The study also revealed that ICTs skill acquired by Science Education students was not on the high extent relevant to self-reliant. It was therefore, recommended among other that Science Educators should make deliberate effort to equip themselves on the use of ICT facilities in the 21st century classroom instructional delivery challenges.

Keywords: Acquisition, ICT Skill, Science Education, Teachers' training and self-reliant.

Building a self-reliant community requires decisions on what types of technology to use. Integrating technology in the classroom involves the use of ICT by teachers to develop, present and describe materials in their subject area; enhance knowledge transfer process especially through animations and simulations, enrich and deepen skills that help learners relate classroom experiences to life practices as

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well as provide real opportunities for individualized instruction to mention a few. The application of technology in the teaching and learning leads to learners self-reliant and self-dependence.

Self-reliance education focused on building knowledge, understanding and wisdom that empower greater independence and satisfaction in daily living. It also focuses on building the confidence and power to pivot at will when faced with challenges in life. Thomas and Itighise (2015) commented that the essence of self-reliance is to improve human conditions. According to Kiplinger (2019) self-reliance occurs each time a teacher thinks about his or her professional priorities or tries to solve a teaching problem. Self-reliance is continuously scripting lessons which can be carried forward into the classroom. Itighise (2018) posits that self-reliance hinge on the urge for self-presentation through the independent use of available human and materials resources to meet individual needs. A graduate of Science Education programme should acquire enough skills for creation of employment. Joseph (2010) comments that Science education graduate has undergone series of training programme to be able to create job for themselves and possibly be employer of labours. Effective teachers use technology to promote a self-directed classroom so that their students know if they cannot solve a problem through the obtained skills. Today, nearly every job involves intermediate to advanced Information and communication Technology (ICT) skills.

Information and communication Technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. Many countries now have high regard to understanding the business environment and add value to the process of learning and management of learning institutions. The use of technology therefore is a driving force for development and innovation in school's system. Its offers special opportunities to stimulate growth and increase innovation in every local sitting, thereby enabling individual and institutions to interact more productively with global economy and the wider world. It has been argued that ICT is a principal driver of economic development and social change world-wide (Akpan and Itighise, 2019); Itighise and Wordu (2016) emphasis that the pedagogies application of ICT involves effective learning with the aid of computer and other information technologies as learning aids.

Akpan and Itighise (2019) opined that ICT tools provides opportunities for remarkable change and transformation in teachers' education due to the ability to draw learning closer to the learners and making teaching easier and simpler to the lecturers. As the world us moving more toward paperless workspaces, every function required at least some level of interaction with computer. Those with sharp skills in using computers get an edge over those who did not when interviewing for the same profit. Iloka (2011) see skills as the manual dexterity acquired through repetitive of operation. Emengonu and Ogunsola (2012) defined skills as the ability to do something expertly well. In the same vein Akpan, Etiubon and Udosen (2017) comments that skills can be regarded as the possession of expertise needed to perform a particular job or a series of jobs and of essence. It must consist of habits that ensure adaptation.

Akpomovie (2011) posit that skills acquisition is essential for human survival. Skills acquisition involved the formation of relevant habits which is usually precedes with relevant knowledge which facilitate correct thinking, leading to correct way of doing thing. Hence computer skills are essential in order to utilize computer

and relate to digital technology efficiently. Computer literacy is therefore defined as the knowledge and ability to utilize computer and related technology efficiently with a range of skills, covering elementary use to computer programming and advanced problem solving. According to McNeely (2019) computer skills fit into two major categories hardware and software that is physical component of the computer and the efficient use of computer programs and applications. When teachers include technology into their classroom practices, learners are more likely to actively participate in learning, especially when used alongside with other conventional methods and learning tools.

The Place of ICT and Science Education

Science is derived from the Latin word *Scientia* meaning to know. Science is a vital knowledge obtained by objective and empirical study of natural phenomenon for the discovering of concepts and techniques that lead to development of human society. Science is the pilot for the existence and use of technology. According to Joseph (2010) the trend in science education in the last 30 years has centered on personal involvement by the student. Before the curriculum reform projects were initiated in United States in the late 1950s that emphasis on science education was on acquisition of factual knowledge. However, the nature of science education in the 21st century demands that students must actively participate for meaningful learning. Learning should be an active search for constructing knowledge rather than passively receiving it, shaping as well as being shaped by experience. Science Education is vital for the development of any nation. This is why all nations pay particular attention to the teaching and learning of science in its institutions. Science Education in Nigeria concentrates on the teaching of science concepts, method of teaching and addressing misconception held by learners a competent science teacher would create classroom condition and climate conducive for student learning using technology.

The use of ICTs tools has reported to improved learners learning environment by maintain the pace of a lesson, increasing students' observation, communication, questioning and generating motivation of boys and girls to equal level by adjusting the classroom learning environment (Abdul 2010). The use of ICT in empowerment of science education trainees requires exposure in the use of electronic technology for education activities; such exposure entails acquisition of computer literacy and the technique in the use of the internet and telecommunication device. Computer enable science education trainers and trainees enhance their use of education online packages. It also serve as an instructional materials which science education lecturers can use to communicate and carry out calculations, drawings, designing and simulation among the students with little or no error, lesser stress and in as shorter time than in a manual operation.

Science education-based discipline needed for self-reliance and sustainability required for great and dynamic economy. The knowledge of ICT skill creates self-employment and help individual generate income for a healthy living and prevent idleness that is responsible for social vices that inhabit socio-economic development. Most employer need an application with computer skills. Basic ICT skill begins with knowing how and when to do routine maintenance and how to cope with frozen programs or damaged USB ports. It is also necessary for creating visually –attractive content for documents, posters and slide presentations. The acquisition of ICT skills for self-reliance required self-discipline, inner motivation and drive.

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There is need to test students computer competency skills on word processing, creating a spreadsheet, using Web browser and email. Virginia (2010) defined ICT illiteracy as a synergistic blend of cognitive, technical and social skills that enable students use technology responsibly and effectively to advance learning and develop strong thinking habits in all subjects' areas. This blend leads each student toward a lifelong ability to communicate, solve problems and access, manage, integrate, evaluate and create information for effective skills acquisition. An Average student uses a computer for homework, online chatting, checking e-mail, and surfing the internet. The more advanced users know how to write a simple Web page, update a ready- made blog site, or download movies perhaps illegally and burn CDs. But for the most part, users have no knowledge about how to set up a local area network or how to troubleshoot their own computer for minor problems. Science educators need to use computer in teaching computer skills beyond fundamentals. Skills such as digital document archiving, Web page design using Dreamweaver or flash, setting up wireless networks, and using a firewall are becoming the norm, where in the past were considered advanced knowledge. **McNeely, (2019) comments that many science educators who uses PowerPoint in their lecture are not using technology interactively. Students need a practical use of technology, to manipulate data or to explore the inner recesses of the human body without cutting up cadavers. Students need to communicate with each other that are why message boards are great. Members-only message boards allow students and faculty to communicate with each other. It allows students and faculty to communicate with each other. It allows the use of course lockers during lectures and provides information outside lecture for students to explore at their own pace. The acquisition of ICT skills as a science education-based graduate enables scientific process skills for self-development.**

ICT and Self-Reliance

ICT skills refer to the ability to operate, manipulate and use ICT facilities and resources well. According to Jobcluster (2019) ICT skills is classified into five broad categories namely:

1. Basic knowledge of computer - this has to do with understanding basic computer hardware component, terminology and basic function of window or macintosh operating system.
2. Proficiency in using productivity software – this deal with the ability to create document of various types and save in a desired location of the computer. It also involved copying, pasting, selecting, deleting and printing of document.
3. Electronic communication skills – it involves use of email, to compose, send, reply and forwarding messages.
4. Internet skill – this involves the ability to setup an internet connection and connect to the internet using any of the Service Providers like MTN. Glo, Airtel for internet connectivity. The skill required having a working knowledge of the www and its functions including basic site navigation, searching, installing and upgrading a web browser
5. Moving files skills – this involves the ability to understand the purpose of Secure File Transfer Protocol (SFTP) and Secure Copy Protocol (SCP) that is transfer file by uploading and downloading file.

For effective deployment of ICT in teaching and learning for self-reliant, teachers should attempt teaching with technologies and giving student practical work and assignment involving ICT skills acquisition for self-development and reliant. Jobcluster (2019) identified basic computer skills that help individual to be self-reliant to include Microsoft Office installation, Web and social skills, troubleshooting, image editing and graphic design, blogging and computer writing skill. The increasing capabilities of computers to collect and so data give marketers more tools to target their ideal customer. Hence effective utilization of ICT facilities in teaching and learning process lead to learners' ICT knowledge self-development which eventually result in learners' self-reliance.

Self-reliance is synonymous with self-sufficiency. According to Ibrahim, Adamu and Ibrahim (2018) self-reliance means doing things for ourselves rather than having things done for us. Self-reliance is the personal initiative in the ability and effort to identify, harness and manage effectively and efficiently the personal and collective resources, human or natural in the immediate surroundings in order to uplift one's or a people's life quality, standard and condition of existence (Olayiwola, 2012). He noted that self-reliance cautions against dependency-syndrome on the government as the monopoly of development. Self-reliance refers to the sole dependence of individual capabilities to improve life. It is the ability of an individual to rely on himself/herself in order to accomplish a specific task and progress in it (Nwokoye, 2011). Acquisition of employable skills and benefits that accrues from it, engender self-actualization and job satisfaction which on the long run can lead to sustainable development.

Self-reliance is having or showing confidence in one's own abilities (Chambers, 2009). In this context, the researchers define self-reliance as the ability of an individual to acquire skills and create job opportunities such that the individual is self-employed and possibly becomes an employer instead of being an employee. Nigeria as a developing nation is filled with many secondary schools and tertiary institutions' graduates who are roaming the streets in search of non-existing white collar jobs (Arokoyu and Nna, 2012). Self-reliance is a viable alternative strategy to "dependent development" and "structural adjustment" in developing survival" (Charles and Lotsmart, 2003). The dwindling Nigerian economy has led to embargo on employment blamed on non-approval of national budget which in turn has given rise to the number of white collar job seekers thus resulting in an un-diminishing poverty level of the populace. It is against this background that ICT skills acquisition becomes a ready alternative for institution science education graduate in Akwa Ibom State, Nigeria.

Empirical Review

The use of Information and Communication Technology (ICT) is fast gaining prominence and becoming one of the most important elements defining the basic competencies of the students. Akpaetor and Udosen (2021) examined utilization of ICT resources for effective instructional delivery and acquisition of Biology concepts in secondary schools in Akwa Ibom State. The study shows that the role of ICT in the 21st century classroom has been variously stressed seamless integration of ICTs in instructional delivery has the potential of facilitating instruction while at the same time enhancing learning. It was therefore, recommended that teachers should be motivated to development and use multi-media

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computers and software relevant to teaching and learning. This can be achieved through the provision of soft loan for acquiring personal computer or supply by the State government at subsidizes rate.

Itighise (2018) examines the roles of educational technology teaching and learning as a panacea for self-reliance and national development it was observed that educational technology teaching and learning in higher institutional play important roles in student's skill acquisition, self-dependent and promotion of national development. The experience acquired in educational technology teaching can be applied to the establishment of business ventures such as photo studio, graphic studio, private schools, computer center, internet center and many other for job and employment creation. It was pointed out that higher education needs to be restructured for actualization of educational goal and formation of self-reliance citizen. It was recommended among others that University Lecturers should play a central role in rebuilding in Nigeria students the habit of skill acquisition and self-reliance not focusing on white caller job. Makgwi(2018) examines the impact of ICT on the accounting system. In this paper, the reduction of paper work which brought speed and accuracy in the system is highlighted. Makgwi looks into how most accounting information are now processed, transmitted using the computer and information technology and the influence to the internet. The changes in the mode of payment especially the e-payment and the use of Automatic Teller Machine (ATM) were also discussed. The finding revealed that the use of ICT in accounting has brought about increase in productivity, speed, competition and innovation.

Statement of Problems

ICT has rapidly changed and revolutionized the nature content and scope of instruction in education. Federal Republic of Nigeria, National Policy on Information and Communication Technology (2010) describe the need to integrate ICT into the mainstream of education training for creative teaching and skills acquisition. The skills acquisition through ICTs utilization in teaching and learning process allows opportunities for learners to develop problem solving abilities, informational reasoning skills, communication skills and other higher-order thinking skills. Most expert in the field of education agreed that the proper used of ICT hold great promise to improve teaching in addition to shaping workforce opportunities. Despite the important role and obvious need for the integration of ICTs, Science Education students are still lacking behind in the acquisition of ICTs skills for self-reliant in major areas such as Web page designing, cyber security, software installation, Website creation, graphic designing, Word Press usage, and ICT trouble shooting which lead to student's self-reliance. This paper therefore, examines ICT skills acquisition in science education teacher programme as imperative for self-reliant.

Purpose of the study

The main purpose of the study is to find out the extent to which ICT skills acquisition in Science Education teacher training program in public universities in Akwa Ibom State bring about graduates' self-reliant and consequently address the high rate of unemployment problem presently facing Akwa Ibom State government in particular. The study is geared toward accomplishing the following objectives:

1. To find out the level the level of acquisition of ICT skills among Science Education students in Universities in Akwa Ibom State.
2. To determine the extent to which ICT skills developed by science Education student during Science Education teachers training program relevant to self-reliant in Akwa Ibom State.

Research Questions

The following research questions were formulated to guide the study

1. What is the level of acquisition of ICT skills among Science Education students in Universities in Akwa Ibom State?
2. To what extent do skills developed by science Education student during Education training program relevant to self-reliant in Akwa Ibom State?

Methodology

The study adopted a descriptive survey design method with a population of 4,162 registered Year Four students of science Education department, 2019/2020 academic session of the two Universities in Akwa Ibom State. The sample of 300 registered students was used. The instrument title Science Education Student ICT Skill Acquisition Questionnaire [SESISAQ] was designed. The questionnaire was developed based on the research questions. Research questions one contained 20-items 4-point rating scale of Strongly Agreed -4 , Agreed -3, Disagreed -2 Strongly Disagreed -1, The research questions two consisted of 10-item of 4- point rating scale of High Extent (HE) -4 , Moderate Extent (ME) -3, Low Extent (LE) -3 and Very Low Extent (VLE)-1. The instrument was validated by two experts in Science Education in department of Science Education, Akwa Ibom State University, while internal consistency was ascertained using Cronbach alpha formula to determine reliability coefficient of 0.75 with 20 respondents which was not part of the sample used for the study. The researcher and research assistant administered the instrument to 300 respondents. The data collected were analyzed using mean and standard deviation statistic to answer the two research questions. In answering research question one, the criterion mean value was 2.50 and items scored the mean of 2.50 and above were regarded as high level while items scored mean value of less than 2.50 were regarded as low level of skill acquisition. The decision rule for research question two was that any mean value equal or greater than 3.50 was regarded as High Extent; below 2.50 - 3.45 was regarded as Moderate Extent; less than 2.49 was regarded as Low Extent while less than 1.50 was Very Low Extent.

Results

Research Question 1: What is the level of acquisition of ICT skills among Science Education students in Universities in Akwa Ibom State?

Table 1: The level of acquisition of ICT skills among Science Education students in Universities in Akwa Ibom State? (N- 300)

S/N	Acquisition of ICTs Skills	Mean	Standard Deviation	Decision Rule
1	I have been exposed to Microsoft office where I can manipulate and type office document with ease.	3.32	0.69	High

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2	I have acquired the requisite skill and have the abilities to create a folder.	3.09	0.66	High
3	I have opportune to work with my lecturer to create a web site.	1.87	0.74	Low
4	I have acquired the skill of using email to compose and send message.0.74	3.12	0.58	High
5	I have been exposed to cyber security skills.	1.25	0.89	Low
6	I am equipped with the knowledge of software programme.	1.82	0.88	Low
7	I have acquired the skill of Microsoft PowerPoint presentation.	3.38	0.64	High
8	I have acquired the skill of e-marketing technology.	2.13	0.72	Low
9	I can use computer to collect and sort data and give marketers more tools to target their ideal customers.	2.38	0.69	Low
10	I have acquired the skill of web page designing.	1.21	0.87	Low
11	I have acquired the skill of computer software development.	1.82	0.88	Low
12	I can create visually attractive content for documents, poster and slide presentation.	3.04	0.62	High
13	I have acquired the graphic design skills in creating signs to video editing.	2.08	0.75	Low
14	I have acquired the skill of using spreadsheet and database management.	2.36	0.79	Low
15	I have acquired ICT troubleshooting skill.	2.13	0.72	Low
16	I have acquired ICT writing skill through using Word Press.	1.25	0.89	Low
17	I have been exposed to software installation skill.	2.15	0.76	Low
18	I have acquired the skill creating sensitive tables in Google sheet to show profit margins at different price point.	1.14	0.82	Low
19	I have acquired the skill of designing instructional materials using Corel Draw application.	3.65	0.58	High
20	I have been exposed to social media skills to convey messages about organization in a high esteem.	3.21	0.73	High

From table 1 mean rating of items 1,2,4,7,12, 19 and 20 were above the criterion mean of 2.50. This shows high level of ICT skills acquisition of Science Education students in Universities in Akwa Ibom State. In other hand the mean rating

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of items 3,5,6,9,10,11,13,14,15,16,17,and 18 were below criterion mean of 2.50. This shows low level of ICT skills acquisition of Science Education students in major ICTs skills such as website creation, e-marketing, webpage designing, cyber security, graphic designing, Word Press usage and ICT trouble shooting. This is an indication that the level of ICTs skill acquisition of Science Education students was low in major areas of ICTs skills.

Research Questions 2: To what extent do skills developed by Science Education students during Education training program relevant to self-reliant in Akwa Ibom State?

Table 1: The extent skills developed by science Education student during Education training program relevant to self-reliant in Akwa Ibom State? (N- 300)

S/N	ICTs Skills Relevance to Self-reliant	Mean	Standard Deviation	Decision Rule
1	Science Education exposes to internet marketing on sort data and gives marketer more tools to target their ideal customer online.	3.05	0.97	Moderate Extent
2	Social media skill make Science Education a good advertiser of online model	2.12	0.68	Low Extent
3	The exposure of software cyber security helps in maintaining cyber security.	2.36	0.79	Low Extent
4	Microsoft office skill make Science Education manipulate and type office document with ease.	2.96	0.73	Moderate Extent
5	The knowledge of using email makes Science Education student production and self-reliant in opening a cyber cafe for checking and sending mail.	2.84	0.83	Moderate Extent
6	Science Education student can cope with contemporary complex technology with the knowledge of cyber security skill.	2.36	0.79	Low Extent
7	With graphic design skill I can create sign to video editing	2.24	0.59	Low Extent
8	Using software programme skill I can be install any programme to computer	2.76	0.77	Moderate Extent
9	With the skills acquired in ICT in Education, I can design instructional material for Nursery and primary school children.	2.96	0.66	Moderate Extent
10	The knowledge of ICT makes Science Education students able to create visually attractive content to document, posters and slide presentation for	3.16	0.99	Moderate Extent

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	business purposes.			
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In Table 2 items 1,4,5,8,9 and 10 shows the mean scores of 3.05, 2.96, 2.84, 2.76, 2.96 and 3.16 respectively. This indicated that the extent of skills acquisition by Science Education students during their Education training programme is moderately relevant to self-reliant in Akwa Ibom State. Items 2,3,6 and 7 revealed low extent of skills acquisition with the mean scores of 2.12, 2.36, 2.36 and 2.24 respectively. This implies that ICT skill acquired during Science Education training programme are not to a high extent relevant to self-reliant and does not make Science Education graduate readily employable in Akwa Ibom State.

Discussion of Findings

The result in research question one revealed that Science Education student acquired the moderate level of ICT skill during their education teacher training programme. This results was contrary to the view of Bauer and Kenton (2005) Science Education teachers’ were highly skilled in technology and had the competencies required for successful technology integration and use of computer skills. According to Abdul (2010) Science Educator needs great improvement in integrating ICT into teaching and learning in order to facilitate the acquisition of basic skills and develop self-reliant teacher trainees.

The finding in table 2 revealed that ICT skill acquired during Science Education training programme are not in high extent relevant to self-reliant. This finding is line with McNeely (2019) that many Science Educators who use PowerPoint in their lecture are not using technology interactively and student need a practical use of technology. The results was also consistent with Papanastasiou and Angeli (2008) whose study revealed a very low frequency with which software programme were actually used in various school subject by teachers. In the same vein Olanrewaju and Adeshina (2016) study revealed that undergraduates of National Teachers’ Institute, Ilorin study Centre has very low access to computer and used of internet facilities. Adomi and Kpangban (2010) supported that the unavailability of some ICTs component in schools and lack of adequate search skills hampers Science Educators use of ICTs facilities for proper training of students for self-reliant skills acquisition and active players in the labour market.

Conclusion

Self-reliance through ICTs skills acquisition was the focus of this paper. It is quite obvious that ICTs provides great potentials as opportunities that can bring about improvement in teaching and learning at all level of Education. Its effective integration for ICTs skills acquisition requires teacher’s competencies and appropriate utilization of ICT facilities in teaching and learning process. It was therefore concluded in the study that Science Education students acquisition of ICTs skills during their training programme was not to the high extent relevant to Science Education graduate self-reliant in Akwa Ibom State.

Recommendations

The followings recommendations were made based on the findings:

1. Science Educators should make deliberate effort to equip themselves on the use of ICT facilities in the 21st century classroom instructional delivery challenges.
2. Workshop and seminar should be organized to Science Educators periodically on major areas of ICTs such as Web page designing, cyber security, software installation, Website creation, graphic designing, Word Press usage, and ICT trouble shooting for appropriate skills acquisition which will lead to student's self-reliance.
3. Science Education students should be encouraged by motivating them to frequently manipulate their digital devices to enhance better awareness on the use of ICTs for skills acquisition.
4. Akwa Ibom State Government should establish a low interest loan schools to avail the Science Educators the opportunity to source funds for the procurement and maintenance of ICT facilities being used for teaching and learning in various institution of higher learning.

References

- Abdul, S. (2010). Challenges prospect of ICT to teacher education. *Academic scholarship Journal* 2(2) 5.
- Adomi, E. E. and Kpangban, E. (2010). Application of ICTs in Nigeria Secondary Schools library philosophy and practice. Retrieved on 16 June 2014 from <http://digitalcommons.unl.edu/libphilpra/345>.
- Akpaetor, A. I. and Udosen A. E. (2021). Utilization of information and communication technology resources for effective instructional delivery and acquisition of biology concepts in secondary schools in Akwa Ibom State. *Nigerian Journal of Curriculum Studies*. 28(3), 5-19
- Akpan, A. O., Etiubon, R. U. and Udosen, I. N. (2017). Science, technology, Engineering and Mathematics (STEM) teachers' preparedness for socio-economic empowerment of senior secondary science students in Nigeria. 60th Anniversary Conference Proceeding. 37-45.
- Akpan, I. F. and Itighise, A. E. (2019). Students' perception of lecturers' utilization of Information and Communication Technology (ICT) tools for instructional delivery in Science Education programme. *Journal of Education and Development*. 3(2) 35-41.
- Akpomuvie, O. B. (2011). The role of traditional skills and techniques in the development of modern science and technology in Africa. *International Journal of Humanities and Social Science* 1(3), 178-187.
- Arokoyu, A. A and Nna, P. J. (2012). Creativity and Process Skills for Self-Reliance Using Demonstration Approach of Teaching Chemistry. *ARNP Journal of Science and Technology*. 2(11): 1029 – 1033.

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- Baver, J. and Kenton, J (2005). Toward technology integration in the schools. Why it is happening. *Journal of Technology and Teacher Education*. 13(4) 519-546.
- Chambers(Ed) (2009) *Chambers Student Learners' Dictionary*. London: Hodder Education.
- Charles, C.F and Lotsmart, N.F. (2003). The Concept of Self-reliance in Community Development Initiatives in the Cameroon Grassfields. *Nordic Journal of African Studies* 12(2): 196-219.
- Emenyonu, C. A and Ogunsola, A. O. (2012). Entrepreneurship education: realities and challenges. *International Journal of education and management science*, 1(2), 86-99.
- Ibrahim, M. S., Adamu, T. A. and Ibrahim, A. (2018). Entrepreneurship, Science and Technology Education for Self-Reliance and Economic Diversification. *International Journal of Engineering Management*. 2 (1): 1-7..
- Iloka, A. M. C. (2010). Introduction to entrepreneurship education in Nigeria in Ogbuagu, J. O. and Nwamaradi, A. T. (eds). *Skill development in Science/Technology Education for MDGs* 210-221.
- Itighise, A. E. (2018). Educational Technology and learning in higher institution: A panacea for self-reliance and National Development. *International Journal of Advancement in Development studies*. 13(1), 163-171.
- Itighise, A. E. and Wordu, N. C. (2016). Concept and uses of information and communication technology in Education in R.R. Okoye, C. U. Eze and M. U. Oluwole (eds) *information and communication technology and education in Nigeria: Challenge and prospects*. Ibadan: Global academic Group online Academic Resources 204 -223
- Joseph, D. E. (2010). *Education and training for industrialization*. Lagos: Striling-Horden Publishers Ltd.
- Jobcluster (2019). Basic computer skills. Retrieved from: <https://www.business.net/computerskillist>.
- Kiplinger, C. (2019). Teaching with self-reliance. Retrieved from: <https://www.kiplinger.com/slideshow/business/toiz-so/best-jobs-for-the-future-2016/index.html>
- Malgwi, B. A. (2018). The impact of information and communication technology on the accounting system. *International Journal of Advancement in Development studies*, 13(1), 255-259

- McNeely, B. (2019). Using Technology as a Learning Tool, Not Just the Cool New Thing. EDUCAUSE. Retrieved from: <https://ams.educase.edu/eweb/dynammicpage.aspx?webcode=commpref>.
- Nwokoye, S. K. (2011). The role of SIWES in realization of sustainable development in Nigeria. *JONATT*, 1 (2): 47-48.
- Olanrewaju, O. S. and Adeshina, O. K. (2016). Cloud computing facebook utilization of National Teachers' Institute undergraduates, Ilorin Study Centre, Kwara state, Nigeria. *Journal of Educational Media and Technology*. 2(1), 58-70.
- Olayiwola, A. O. (2012). Social Science Education for Self-Reliance. *Journal of Education and Leadership Development*. 4; 13-18.
- Papanastasopoulos, E. C. and Angeli, C. (2008). Evaluating the use of ICT in educating psychometric properties of the survey of factor affecting teachers teaching with technology (SFA-T3) *Educational Technology and Society* 11(1), 69-86.
- Thomas, N. A. and Itighise, A. E (2015). School plant development and management: A panacea for self reliance and economic development in Nigeria. *Academic Discourse: An International Journal*. 8(1), 208-221.
- Virginia Department of Education (2010). Educational technology plan for Virginia. Retrieved from: <https://www.doe.virginia.gov/VDOE/technology>.