



The Role Of ICT-Driven Instructional Media As An Integral Tool In Improving NCE Students' Performance And Retention

¹Lawan Dumai Musa & ²Yusuf Ibrahim Wuyo

¹Curriculum and Instructions Department
Umar Suleiman College of Education Gashua, Yobe State, Nigeria
lawandumai2017@gmail.com/08065898253, 07013359498

²Umar Suleiman College of Education Gashua, Yobe State, Nigeria
08069017875 ,08026791362

ABSTRACT

This research work aimed to explore the role of ICT- Driven instructional media as an integral Tool in improving N C E Students performance and retention in Umar Suleiman College of education Gashua. A quasi- experimental research design was adopted. Related literature was reviewed. Two research questions and two research hypotheses tested at 0.05 level of significance were raised to guide the study. The population of the study comprised 460NCE II students from school of Education, Umar Suleiman Gashua Yobe State. The instrument used for data collection was Educational Technology Achievement Test (ETAT) and the data were analyzed using mean and standard deviation for the research questions, and t-test for the hypotheses. The sample used was N C E II students which was selected by the use of random sampling techniques in ration of 30:30 (intact class) students for both experimental and control group respectively. The results showed that students who were taught with ICT had better academic performance and retention on Educational technology course. Based on the findings, it was recommended that, all the courses in college should be taught with I C T not only Educational technology.

Keywords: Communication, Information, Instructional Media, Performance, Retention

INTRODUCTION

The involvement of Information and Communications Technology (ICTs) in educational institution has change teaching and learning. Students with different learning styles are able to increase their learning abilities when instructors use ICT to support their teachings. ICT help the learners to be more independent, reflective and self-regulated in their learning process. Furthermore, ICT makes it easy to deliver virtual instruction to learners (students) outside the classroom. ICTs help student's master materials and skills though it depends on the teacher's instructional goal, students' levels, instructional needs and available resources. Jones (2010) in Igori, Eru and Inalegwu (2019) reveal it that technology travels with people. Information and Communication Technology (ICT) can be defined as a diverse set of electronic technologies and technological tools and resources used to communicate, create, store, disseminate and manage information. Liu (2005) in Igori, Eru and Inalegwu (2019) is of the view that I C T is the integration of technologies for collecting, storing, processing, communicating and delivering information. Information Communication Technology is regarded as an engine for growth and tool for empowerment with profound implications for education, change and socio-economic development. Information Communication Technology such as videos, televisions, multimedia and computer software which combines text, sound and colourful moving images can be used to provide challenging and authentic content that will engage the students in the learning process (Igori, Eru & Inalegwu 2019) has asserted that educational institutions may utilize ICT to enrich the students with skills and knowledge for the 21st century (Badeleh & Sheela, 2011), such that it can add

to worldwide accessibility to education, educational equality, broadcasting of quality teaching learning programs, educators' professional growth and to help in obtaining a more effective educational management. Hence, accessibility, inclusion and standard being the key issues of education, can be comfortably addressed through ICT. ICT improves the standard of education by encouraging learning through ongoing discussion, delayed time discussion, directed instruction, self-learning, critical thinking, data seeking and analysis (Carrillo, Onofa & Ponce, 2010). Utilization of ICT can enhance outcomes, instruction, and administration and create important abilities in the underprivileged groups and at the same time influence educational instruction and research process (Andoh, 2012).

In teaching and learning process, the utilization of information and communication technology (ICT) is essential as it enable the teachers and students to operate, store, control and retrieve data other than to improve self-regulated and active learning (Ali, Haolader & Muhammad, 2013 in Igori, Eru & Inalegwu 2019). ICT-based learning includes an expanded propensity towards collaborative learning among learners and instructors, not just in a specific classroom. This kind of collaboration is in contrast to the conventional learning environment, for example, distance learning inspires educators and learners to engage in learning even after school time (Ali, Haolader & Muhammad, 2013 in Igori, Eru & Inalegwu 2019).). The system aid teachers to plan and make lessons and design materials such as course content (Igori, Eru & Inalegwu 2019). The recent development of this system has change teaching and learning style as new development in technological advancement in education has given birth to the re-examination of new techniques and instruments/materials in teaching process.

Advancement in the field of science and technology leads an increased availability of teaching and learning materials/ resources which are known as audio-visual aids or techniques. Development in technology have brought instructional/teaching materials especially the projected and electronic materials to the forefront as the most radical tools of globalization and social change which have affected the classroom teaching-learning situation positively. They are the essential landmarks in knowledge transmission. Unfortunately, the employment of audio-visual techniques as an integral part of instructional technology is very limited in India as compared to the Western countries where it is being used extensively with great effect. The limited employment of audio visual techniques in India may be attributed to the inadequate appreciation of the impacts of the techniques, lack of commitment to improved instructional methods, and lack of support from the authorities. It therefore implies a thorough understanding on the part of the teachers and school authorities towards the relative merits of technological aids and its application to achieve the best result (Natarajan, 2005)

Ema and Ajayi (2004) opined that the application of such technological aids can be facilitated only when teachers understand its applicability and acquire the needed skills for the use of intricate mechanical equipment. Without the knowledgeable teacher, instructional materials cannot create change and progress in the teaching learning process. It begins to make impact only when the teacher begins to make use of it and allows it to make over its values. Therefore teachers have to be properly motivated and made interested in the use of such materials. Teachers have to be trained and oriented in the adequate use and maintenance of the materials. It is often found that these devices or media have been hurriedly introduced and used without sufficient planning and forethought.

Effective instructional delivery of teachers in Nigerian secondary school in all subjects and their ability to teach modern entrepreneurship, technological and scientific approach is 3423determined by the medium of communication used. Thus, good media means good teaching and learning. The need for using current and effective media approach is caused by the fact that there has been change in organization structure curriculum and trends like climate change which necessitated that new measure of instructional delivery must be employed. Lack of pictorial support for class discussions lead to the teaching of abstract lessons, misunderstanding of concepts and skills, and ineffective learning that negatively affects learner performance and output in terms of what is taught and learned by means of instructional materials. This research will be carried out purposely to reveal out the availability, utilization as well as the bottle neck experiences by the teachers in the administration of such materials (Seth, 2009).

Statement of the Problem

Information and Communication Technology I C T s provide a multiple opportunity for schools/ institutions of learning and other organizations to support and utilize technology to enrich the teaching and learning process. However, despite the effort made in using ICT in Colleges of Education in Yobe

state, still the affirmation colleges are experiencing the challenges of how to transform students learning process to provide students with the skills to function effectively in this dynamic, information- rich, and continuously changing environment. The point to focus is that unless this problem is pin-pointed, or else the development of ICT in the Colleges is going to be put to waste and improvement in the quality of teaching and learning is going to be less lively. This may leads the College fail to achieve its objectives. For this reason, the researcher view that there is need to examine the role of I C T driven- instructional media as an integral tools in improving N C E students' performance and retention. Bello (2014) affirmed that the problem of poor school performance is generally caused by poor method of teaching in schools. This shows lack of appropriate and adequate application of educational technology (ICT) that could bring about maximum and effective teaching and learning process. The 21st century teaching and learning technologies are so flexible and inclusive that teachers need to wake up from their slumber and embrace these technologies if they want to be relevant in this era of Information and Communication Technology. Despite the facilities provided, school teachers are unable to integrate ICT in their educational practices and pedagogy (Adeyemi and Olaye 2010; Yusuf, 2005). Teachers ought to avail themselves with the appropriate technological disposition for the utilization of technologically driven ideas that will transform the teaching from the popularly acclaimed traditional method of teaching that is largely oratory to activity based instruction. Ekula (2016) View that Information and Communication Technology facilities can be used to improve the quality of teaching and learning at any level of education. In fact Information and Communication Technology facilities are becoming part of the daily tools for teaching and learning, thus their use in education by teachers and students is becoming a necessity.

Objective of the Study

- To find out the roles of ICT-Driven Instructional Media in improving NCE students' performance.
- To determine the strength of ICT-Driven instructional media on NCE students learning retention.

Hypothesis

- There is no significant difference between ICT-Driven Instructional Media and NCE students' performance.
- There is no significant difference between ICT-Driven Instructional Media and NCE students' learning retention.

LITERATURE REVIEW

The current technology such as computers and Telecommunication have been the most and worthy of mentioning and transformative of the technologies emerging over the past 30 years. Hence, multitude literature has been reported on the evaluation of the level of the adoption and usage of ICT tools by the students for enhancing their academic performance. Shahzadi and Shabbir (2021) Oye et al. (2014) in Shahzadi and Shabbir (2021) expressed that the usage of ICT has brought improvement in human knowledge. The authors further argued that the adoption of ICT in educational institutions has built an information bridge between the students and teachers. Furthermore, Hennessy et al. (2005) stated that ICT opens multiple doors for teachers and students to use technology for their academic activities. Moreover, Wang and Woo (2007) reported that the term ICT was not new for educational institutions it is as old as television and radio. But the emergence of new technologies like WWW has attracted the students and teachers to adopt ICT for teaching and learning purposes.

Brown & Czerniewicz (2017) explored the different between the male and female students' access and usage of ICT for learning purposes (Basri et al., 2018). In another study, Slechtova (2015) investigated the behavior of the students of different disciplines towards the usage of ICT. The findings of the study pointed that the majority of the respondents were willing to use ICT for their academic purposes. Furthermore, Conole et al. (2008) studied the experiences of the students for using ICT tools. Data were collected from the students of four different disciplines of the institution. Findings of the study showed that the students had good facilities for having access to modern technology for their learning purposes (Jaiswal, 2020). In another study Thinyane (2010) analyzed 1st-year students' access to ICT tools for their academic purposes. A survey method was employed for data collection purposes from 290 students of two different South African Universities. The results of the study exposed that majority of the respondents had been using the technology for fulfilling their

academic requirements Bartelet et al., 2016 in Shahzadi and Shabbir 2021 examined the impact of the usage of the internet on the academic performances of the undergraduate and post-graduate students of the University of Punjab, Pakistan. The findings of the study portrayed a positive impact of the usage of the internet on the academic performances of the students. Moreover, the study highlighted that most of the respondents were using the internet for assignments and for conducting academic researches.

While Ghazi et al. (2013) in Shahzadi and Shabbir (2021) conducted a study on the barriers to the effective use of ICT in distance education. The data were collected from 200 students and 50 teachers. The results of the study recommended policy framework, adoption of ICT at all institutions, capacity building training for faculty, revision of curricula, electricity break down, provision of quality internet connectivity, and updating the existing infrastructure.

In another Study, Igori and Indegwu (2019) explored the effect of I C T on Students' academic performance in science education in college of education. The results showed that students who were taught with ICT had better academic performance on Chemistry and that the gender has no significant effect in the academic performance of students who were taught Chemistry with ICT instructional package. Based on the findings, it was recommended among other things that Chemistry teachers should use ICT for teaching Chemistry in colleges of education.

Information communication technology (ICT) has no doubt changed the face of teaching and learning globally. Serious nations are taking the advantages inherent in ICT to impact on the educational sector. Though Nigeria is also making efforts to join the ICT fray, these efforts appear to be ineffective. Computer laboratories are largely non-existent in many public schools across the country. Where they exist, they are nothing to cheer. Due to this general neglect and other factors, comprising corruption, out dated curriculum, ill-motivated teachers, materialism and academic laziness on the part of Students and Teachers, the nation has been reaping mass failure in public examinations. Arising from this, stakeholders are calling on government to provide basic facilities including ICT-driven teaching aids for the nation's educational system (The Punch Newspaper 2012)

The computer-based education is an instructional strategy that has been acclaimed all over the world. For example a number of educationist and researchers has attested to the effectiveness of computer based strategy Olufunmi, (2007). Augustine, (2009) asserts that the dominance of teacher-talk in class instruction involves only the learners' sense of learning which practice could be boring after a while. Therefore the more the number of sense involves in the instructional process the more enduring the learning become. Indeed, the use of new technologies of Information and Communication transforms traditional teaching and assists the adaptation of new curricula and new courses in existing applications (Petridou and Spathis, 2001; Mohamed and Lashire, 2003) in Belias *et al.* (2013). Kompa (2012) posits that teacher- learning fosters a culture whereby the learner does not outgrow his dependency on the supervising instructors and in a nutshell, computer availability alone will not have an impact, policymakers and project leaders should think in terms of combinations of input factors that can work together to influence learning. Coordinating the introduction of computers with national policies and programmes related to changes in curriculum, pedagogy, assessment and teacher training is more likely to result in widespread use and impact Kozma, in Cabrol and Severin (2013).

Ultimate power of technology is the information and the communication. ICT is vital for social life, business and economy, to meet the demands of modern information society, and for the progress of education (Aduwa Ogiegbaen & Iyamu, 2005). Use of ICT in education improves the quality and the quantity of education (Balasubramanian et al., 2009) and causes better innovative, creative and cognitive thinking, higher productivity, efficiency, and educational outcomes (Adeosun, 2010). ICT facilitates both instructional and learning process (Jung, 2005) and has a great influence on teaching and learning at higher education. It provides opportunity for personalized, flexible and asynchronous learning and shifts the learning from teacher centred to student centred and hence is a catalyst for reforms about classroom, educational institute, community and system (Youssef & Dahmani, 2008). It enhances the learning of the students, helps the students to learn new skills set, promotes social mobility, helps the citizens to compete in a worldwide economy, and thus has a multiplier effect across the education system (UNESCO, 2014).

However, computer affected the educational process more than anything else. In addition to audio and visual sense, computer activates the sense of touch of the user as well. It provides the opportunity of higher interaction to the users for the development of their individual, creative, and intellectual

abilities. Radio and television are now considered comparatively traditional technologies in education system as students remain passive learners while using these. Computers, however, provide more productive and innovative instruction and learning to enhance the intellectual and creative potentials of the students in today's information society (Aduwa-Ogiegbaen & Iyamu, 2005). Therefore, computer has been integrated in teaching faster than the previous audio visual technologies (Balasubramanian et al., 2009). Computers and Internet offer excellent and plenty opportunities to the students through the use of text, graphics, multicolor images, motion, and audio for the development of their creative talents and high quality learning. Computer offers more learner centered instruction, independent investigation, personalized activities, and teamwork. It offers a variety of contents and symbolic modes to the learner and acts as a partner and tutor who interacts with a learner thus offering opportunity for individualized learning to the students. Internet is playing the major role in the dissemination of information and knowledge in this global village (Aduwa-Ogiegbaen & Iyamu, 2005).

Ekula (2016) had investigated on the effect of I C T facilities on the academic performance of N C E students in computer application course in federal college of education North- west Nigeria. The result revealed that Lecturers should develop computer skills and be properly trained in the use of ICT facilities in teaching and learning computer application course and that That ICT facility alone has no effect on how the students understand lectures, how the lectures are being taught and the academic performance of students in computer application course. Based on this finding, it was recommended that Head of Departments should make sure that computer oriented courses are taught by lecturers who are trained in the use of ICT facilities in teaching and learning.

In another narration, Shahzadi and Shabbir (2021) had research on a topic titled measuring the impact of I C T on Students' Academic Performances: Evidence from Higher Educational Institutions of the Remote Areas of Pakistan. The results showed that 150 (39.5%) respondents were using ICT for academic events and 142 (37.4%) respondents were using ICT for their assignment completion. Furthermore, the study also highlighted some major challenges preventing students from using ICT are such as, 139 (36.6%) electricity failures, 150 (39.5%) leakage of privacy, and 120 (31.6%) lack of training and 178 (46.8%) the poor internet connectivity. The study also suggests steps that if taken would ensure better use of ICT and, in the long run, would establish a stable and productive relationship between ICT and student academic performance.

METHODOLOGY

The design for this research is quasi-experimental involving pretest, posttest. The population of the study constitutes the two Colleges of education in Yobe State, which are Federal College of Education (Technical) Potiskum and Umar Suleiman College of education Gashua. However, the researchers selected state owned college of education for convenience. The sample used was NCE II students which was selected by the use of random sampling techniques in the ratio of 30:30 students for both experimental and control groups respectively. The entire null hypothesis was verified at ≤ 0.05 level of significance with the aid of SPSS software, H_{o1} and H_{o2} was analyzed using comparative t- test, to answer the intended research questions, mean and standard deviation was also used for both performance and retention.

RESULTS

Pre-test performance of experimental and control groups

Table 1: Mean and Standard Deviation Scores of Performance of Students in Educational Technology for Experimental and Control Groups

Group	N	Mean	SD
Experimental	30	13.10	2.20
Control	30	12.50	2.30

Table No. 1 shows the mean scores of 13.10 and 12.50 for the experimental and control groups and their standard deviation scores were 2.20 and 2.30 respectively for the pre-test. The pre-test was conducted to ascertain the academic equivalence of the experimental and control groups in

Educational Technology before the teaching commenced. This result showed that the students in the two groups were equivalent in terms of their previous knowledge of the subject.

Research question 1: *Is there any difference in the academic performance of students who were taught using ICT-Driven instructional media and those taught with traditional method?*

Table 2: Mean and Standard Deviation Scores of Performance of Students in Educational Technology for Experimental and Control Groups (Post-test)

Group	N	Mean	SD
Experimental	30	15.20	1.90
Control	30	13.40	2.30

Table No. 2 shows the mean scores of 15.20 and 13.40 for experimental and control groups for post-test. The results indicated a higher mean score for experimental group than the control group on the concept of Educational Technology. The standard deviation score of 1.90 for experimental group was less than 2.30 for the control group; this shows a better rate of dispersion of the experimental group than the control group respectively.

Table No. 3 shows that the calculated t-value of 3.14 is greater than the critical t-value of 1.93 at 0.05 significant level, so, hypothesis one was rejected. Thus, there is a significant difference in the academic performance of NCE II students who were taught Educational Technology with ICT instructional package with mean scores of 15.20 and those taught with conventional method with mean scores of 13.40. Those who were taught Educational technology with ICT performed better than those taught with conventional method.

Research Question 2: *Is there any difference in the retention of learning between the students who were taught with ICT-Driven instructional media and those taught with conventional methods?*

Table 4: Distribution of Mean Score of Students Learning Retention NCE II Students in Educational Technology

Groups	N	X	SD	SE	Mean difference
Experimental	30	15.20	1.90	0.84	3.5
Control	30	13.40	2.30	0.77	

Statistics in Table 4 shows the mean score of students learning retention in Educational Technology for experimental and control groups, after treatment that is post-post-test. The experimental group has (16.27) as mean score of retention level. While the Control has (12.77) with a mean difference of (3.5). The result revealed that experimental group retained Educational Technology concepts longer than the control group.

Hypotheses 2: There is no significant difference in the level of retention between the students who were taught with ICT driven- instructional media and those with conventional method.

Table 5: t-test Analysis of Students Learning Retention on Educational Technology Concepts after Treatment (Post-Post-Test)

Groups	N	X	SD	SE	df	t_value	p_value	Remarks
Experimental	30	16.27	4.56	0.84	29	2.86	0.008	Significant
Control	30	12.77	4.22	0.77				

Significant at the $P \leq 0.05$ levels

From the statistics in Table 5 it can be deduced that, the level of students learning retention differ significantly before and after treatment on Educational Technology concepts with $t(29) = 2.86$; while $P = 0.008$. This statistically testifies that, the ability of the two groups to retain Educational Technology concepts differ significantly. Since $P \leq$ value (0.008) is less than 0.05 level of significance. Therefore hypothesis three is there by rejected and that the treated experimental group retain the learning Educational Technology concepts better.

DISCUSSION

The results of the study indicate that students who were taught with ICT has better academic performance than those taught without it. The t-test analysis in table 2 showed better academic performance by the experimental group because of the use of ICT instructional package in teaching educational technology. The above result, showed clear that the use of ICT instructional package has improved the teaching and learning of educational technology among NCE students which leads to better achievement by the learners. The findings of this research is in agreement with the submission made by Igori (2019) that the students taught with ICT had better academic performance on Chemistry. The findings of this study is in connection with the assertion made by Miciano (2005), that the use of instructional materials in teaching Mathematics enhance the academic performance of students in the subject.

The study is in line with that of Shahzadi (2021) which revealed that ICT provides an opportunity for versatile and serial learning and shifts the pattern of learning from teacher-focused to student-focused. The results showed that 150 (39.5%) respondents were using ICT for academic events and 142 (37.4%) respondents were using ICT for their assignment completion.

As regard to retention, the statistics in Table 5 indicate that, the level of students learning retention differ significantly before and after treatment on Educational Technology concepts with $t(29) = 2.86$; while $P = 0.008$. Therefore, it is statistically testifies that, the ability of the two groups to retain Educational Technology concepts differ significantly. This study is in agreement with that of Benson et al (2021) in his topic title : enhancing students' retention of knowledge using two eLearning strategies in Basic Science and Technology in which the study revealed that, BST students in the experimental groups taught using Machine Assisted Learning (MAL) and Virtual Science Laboratory (VSL) demonstrated durable knowledge of learning experiences and therefore scored better than their control group counterparts taught using expository strategy. This finding is in agreement with Atomomatofa (2013) who found significant difference in the retention scores of Physics students when taught with e-learning and conventional lecture method. Similarly, Ameh (2013) investigated the effects of adapted Intelligent Tutoring System in the teaching of Introductory Physics and found that, the strategy enhanced academic retention better than the talk-and-chalk method.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. Government should provide funds to college of education to enable teachers provide Information and Communication Technology (ICT) tools for teaching as it improve students' academic performance.
2. Teachers should try to use ICT materials in the teaching and learning in college of education, in order to improve the retention level of the students and School administrators should encourage teachers to use relevant ICT materials in teaching and learning.

REFERENCES

- Adeosun, O. (2010). Quality basic education development in Nigeria: Imperative for use of ICT. *Journal of International Cooperation in Education*, 13(2), 193-211.
- Aduwa-Ogiegbaen, S. E., and Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Educational Technology & Society*, 8(1), 104-112.
- Akude, I. and Ajuzie, N. (2011). Undergraduate economics students' accessibility to, and utilization of internet facilities in AlvanIkoku Federal College of Education, Owerri. *Journal of Education Media & Technology*, 15(1), 47-56.
- Ali, G. Haolader, F. A., & Muhammad, K. (2013). The role of ICT to make teaching-learning effective in higher institutions of learning in Uganda. *International Journal of Innovative Research in Science, Engineering and Technology*, 2(8), 61-73
- Ameh, Z. I. (2014). Students' performance drops as WAEC releases 2014 results. Retrieved May 2019 from <http://dailypost.ng/2014>
- Andoh, C. B. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of*

- Education and Development using Information and Communication Technology, 8(1), 136-155.
- Atomatofa, R. (2013). Effect of advanced organisers on attainment and retention of students' concepts of gravity in Nigeria. *International Journal of Research Studies in Educational Technology*, 2 (1), 81-91.
- Badeleh, A. and Sheela, G. (2011). Effects of information and communication technology based approach and laboratory training model of teaching on achievement and retention in chemistry. *Contemporary Educational Technology*, 2(3), 213-237. 7.
- Balasubramanian, K., Clarke-Okah, W., Daniel, J., Ferreira, F., Kanwar, A., Kwan, A. West, P. (2009, July). *ICTs for Higher Education*. Background paper from the Commonwealth of Learning, UNESCO World Conference on Higher Education. UNESCO World Conference on Higher Education Paris, 5 to 8 July 2009. Retrieved from <http://unesdoc.unesco.org/images/0018/001832/183207e.pdf>.
- Bartelet, D., Ghysels, J., Groot, W., Haelermans, C. and Maassen van den Brink, H. (2016), "The differential effect of basic mathematics skills homework via a web-based intelligent tutoring system across achievement subgroups and mathematics domains: A randomized field experiment". *Journal of Educational Psychology*, Vol.108No.1, p.1.
- Basri, W.S., Alandejani, J.A. and Almadani, F.M. (2018), "ICT adoption impact on students' academic performance: Evidence from Saudi universities". *Education Research International*, Vol.2018.pp.1-9. <https://doi.org/10.1155/2018/1240197>
- Belias, D. Sdrolias, L. Kakkos, N, Koutiva, M. Koustelios, A. (2013). Traditional teaching methods vs. teaching through the application of information and communication technologies in the accounting field: Quo Vadis? *European Scientific Journal*, 9 (28), 1857 – 7881.
- Benson A E etal (2021) Use of E- Learning Strategies and students retention of knowledge in basic science and Technology vol 9 ISSN636.
- Brown, C. and Czerniewicz, L. (2017), "Making sense of Gender and ICTs in Education: Exploring theoretical explanations for complex findings". Cheryl Brown and Laura Czerniewicz University of Cape Town. pp.1-9.
- Carrillo, P., Onofa, M., & Ponce, J. (2010). Information technology and students achievement: Evidence from a randomized experiment in Ecuador. Inter-American Development Bank: Department of Research and Chief Economist. IDB Working Paper Series No. IDB-WP-223 Teachers Association, 5(1), 12-18. 9
- CEO Forum on Education Technology (2001). *School Technology and Readiness Report: Key Building Blocks for Student Achievement in the 21st Century: Integrating Digital Content*. Washington, DC: Author. Available at: <http://www.ceoforum.org/downloads/report4.pdf>.
- Conole, G., De Laat, M., Dillon, T. and Darby, J. (2008), "Disruptive technologies pedagogical innovation': What's new? Findings from an in-depth study of students' use and perception of technology". *Computers & Education*, Vol.50 No.2, pp.511-524.
- Ekula, I O O (2016) *Effect of I C T Facilities on the Academic performance of students in computer application course* in federal colleges of Education North west Nigeria, vol 6 No 8, 2016.
- Ema, E. & Ajayi, D. T. (2006). *Educational Technology: Methods, Materials, Machines*. Jos: Jos University Press Ltd.
- H.L. (2007), "Systematic planning for ICT integration in topic learning". *Educational technology and society*, Vol.10 No.1, pp.148-156.
- Hennessy, S., Ruthven, K. and Brindley, S. (2005), "Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change". *Journal of curriculum studies*, Vol.37No.2, pp.155-192.
- Igori, W, Eru, J O, Inalegwu. OO (2019) Effect of I C T on students' academic performance in science education vol 14, issue 2 & *Society*, 8 (2), 94-101.
- Jaiswal, P., (2020), "Integrating Educational Technologies to Augment Learners' Academic Achievements". *International Journal of Emerging Technologies in Learning (IJET)*, Vol.15No.2, pp.145-159.

- Jones, F. (2010). A new generation of learners? The next generation and digital natives. *Learning, Media and Technology*, 35(4), 365-385.
- Jung, I. (2005). ICT-Pedagogy integration in teacher training: Application cases worldwide. *Educational Technology*
- Kompa, J. S. (2012). *Disadvantages of Teacher-Centred Learning*. Retrieved 19/09/2013, 4:06pm from joanakompa@gmail.com.
- Liu Z (2005). Reading Behaviour in the digital environment: changes in Reading behaviour over the past 10 years. *J. Doc.*, 61 (6): 700-12 11
- Miciano, T.A. (2005). *Fundamental principles on teaching Mathematics*. New York: McGraw-Hill Book.
- Montreal: UNESCO Institute for Statistics. Retrieved April 18, 2017 from <http://www.uis.unesco.org/Communication/Documents/ICT-asia-en.pdf>.
- Natarajan, M (2005) "Innovative Teaching Techniques for Distance Education," *Communications of the IIMA*: V (5) 4-10.
- Olufunmi, A. (2007). *Effect of computer assisted instructional package on per-service teachers' knowledge, classroom practices and secondary schools learning outcomes in Christian religious studies. Unpublished Ph.D. Dissertation*. University of Ibadan. *Performance. Evidence from the higher educational institutions of remote areas of Pakistan* (e (journal) 5476.
- Seth, A.K. (2009) Explanatory correlates of consciousness Theoretical and computational challenges. *Cognitive Computing*, V (1), 50-63.
- Shahzadi and shabbier(2021) *Measuring the impact of I C T on Students' Academic*
- Slechtova, P. (2015), " Attitudes of undergraduate students to the use of ICT in education". *Procedia-Social and Behavioral Sciences*, Vol.171, pp.1128-1134.
- Thinnyane, H., (2010), " Are digital natives a world-wide phenomenon? An investigation into South African first year students' use and experience with technology". *Computers & Education*, Vol.55No.1, pp.406-414.
- UNESCO. (2014). *Information and communication technology (ICT) in education in Asia: A comparative analysis of ICT integration and e-readiness in schools across Asia*.
- Youssef, A. B., & Dahmani, M. (2008). The impact of ICT on student performance in higher education: Direct effects, indirect effects and organizational change. *RUSC. Universities and Knowledge Society Journal*, 5(1), 13.
- Yusuf, M. O. (2005). Information and Communication Technology and Education Analyzing the Nigerian National Policy for Information Technology. *International Education Journal*, 2005, Vol., 6(3), pp. 316-321.