Innovations

Effects of communication technology instructional intervention on achievement of basic science and technology among junior secondary school students in Delta State, Nigeria.

Iroriteraye-Adjekpovu, Janice Imizuokena (Ph.D)
Department of Science Education,
Delta State University, Abraka
Ovuworie Onoriode Oghenewede
Department of Science Education,
Delta State University, Abraka
Umukoro Emmanuel
Delta State College of Education, Warri
Corresponding author: **Iroriteraye-Adjekpovu, Janice Imizuokena (Ph.D)**

Abstract
The paper investigated the effects of communication technology instructional intervention on academic achievement of Basic/Elementary Science and Technology students in Delta State. The paper adopted a pre-test - post-test quasi-experimental design. The population constituted of 21,937 JSII students of Elementary Science and Technology in 179 public/government secondary schools in Delta State. A purposive sampling technique was employed and 223 JSII Basic Science and Technology students made up the study sample size. Basic Science Achievement Test (BSAT) was the instrument used for data collection. The reliability of the BSAT was established using the Kuder-Richardson formula 21 which yielded a coefficient index of 0.77. The data obtained were analysed using mean, standard deviation, t-test and Analysis of Covariance (ANCOVA). The results indicated a significant difference in the achievement mean scores between students instructed Basic/ Elementary Science and Technology with communication technology instructional intervention and those instructed with the lecture method, in favour of students taught Basic/Elementary Science and Technology with communication technology instructional intervention; there was no significant difference in the mean achievement scores between male and female students instructed Basic/Elementary Science and Technology with communication technology instructional intervention; and there was no significant interaction effect of teaching method and sex on students' achievement in Elementary Science and Technology. It was therefore, recommended that communication technology instructional intervention should be adopted by Basic/Elementary Science and Technology Teachers in the teaching of Basic/Elementary Science and Technology concepts at junior secondary school level to enable them apply scientific and technological knowledge and skill.

Keywords*: 1.Basic/Elementary Science and Technology, 2.Communication Technology Instructional Intervention, 3.Academic Achievement.*

Introduction

Basic/Elementary science and technology is one of the subjects that bring about sustainable human, technological and economic development. Basic Science Technology is interplay between Science and Technology. Science and technology interplay with the society to bring about sustainable development. Knowing how important science and technology are, Upper Basic schools in Nigeria teach science classes like Basic Science to lay the groundwork for future science and technology developments. Science is the body of knowledge that comes from the systematic/orderly study of the composition or structure and behavior of the physical world. This is done by observing, measuring, and experimenting, and then coming up with theories to explain what happened (Ajay i& Ogbeba, 2017). Ada and Okwu (2009) also say that science is the systematic or methodical and practical study of natural things with the goal of learning or discovery of more knowledge. Technology on the other hand refers to all tools and procedures used or required for manufacturing and producing materials needed for daily life (Stanley, 2018).

Enemarie (2016) opined that, Nigeria is looking forward to be among the most scientific and technologically advanced nations globally. The reason is not farfetched from numerous contributions of science and technology to human development. The author continued by saying that if any country, and Nigeria in particular, is to make progress in the realms of science and technology, then preparation for a solid foundation in basic scientific education for her population must begin at an early age. This is children starts thinking about potential job paths at tender age. In order to keep up with the times, basic science and scientific concepts are introduced to elementary school students at an impressionable age. The purpose of teaching Basic Science to students in the middle and upper levels of basic education is to help them solidify the scientific information they gained in elementary school and prepare them for the study core or fundamental science subjects/disciplines like biology and at senior secondary education level. Upper Basic Education in Nigeria includes an emphasis on the basic/natural sciences, including Basic Science, while senior secondary education focuses on the more advanced sciences, including Biology. Students at the secondary school level cannot move on to study Biology without first gaining the theoretical and practical foundations provided by Basic Science. This claim is supported by the work of Ekundayo (2012), who writes that exposure to the basic or fundamental sciences prepares students to grasp the more complex ideas presented in the core sciences.

The Basic Science curriculum is interdisciplinary in nature, integrating and synthesizing topics from biology, chemistry, physics, astronomy, geology, and the environmental sciences to present a coherent and comprehensive picture of science (FRN, 2013). Students are given an overarching perspective on Basic Science rather than a focus on its component parts like Physics, Chemistry, or Biology. The general fear of studying science is eradicated, and students are at the epic and centre of the learning process, thanks to the broad-based multidisciplinary: industry-oriented approach. According to Abah (2004), the goal of the basic/elementary science curriculum is two-fold: to provide a solid education for all students in Nigeria, and to provide a solid groundwork for these children who would go on to study science subjects like Biology. According to Adeniyi (2010), the learners should be able to fulfil the following general objectives because of completing the Basic Science Curriculum:

- to cultivate an interest in science and technology;
- to acquire fundamental skills in science and technology;
- to apply their scientific and technological knowledge and skills to meet the needs of society;
- to take advantage of the numerous career opportunities made available by science and technology; and
- to acquire the background necessary for further study in science and technology.

Communication technology instructional intervention (CTII) entails the use of information communication and technology (ICT) devices in classroom instructional delivery. Communication

technology refers to the utilisation of computers in many settings, such as education and government, to retrieve, send, and manipulate data. It encompasses all forms of communication technology, including cellular phones, satellite systems, television, videos, radio, computers, computer network software and hardware, and the myriad of applications that are associated with these technologies, such as video conferencing and online education. The integration of technology into educational settings has shown positive results but also has produced some undesirable side effects. There is a widespread belief that information and communication technologies (ICT) improve the quality of education and transform teaching and learning processes from being highly teacher-dominated to being student-centred. This change will help children to strengthen their creativity, informational reasoning, problem-solving, and communication skills. ICT is also thought to make teaching and learning more student-centred. (Khan et al., 2015). The use of information and communications technologies (ICTs) is widely recognized as a contemporary tool that gives instructors the ability to alter their teaching strategies in order to improve students' academic performance.

Despite the numerous benefits of elementary science and technology to national sustainable development, the teachers of science and Technology do not seem to adequately possess the required skills thereby creating competency gaps during instructional delivery. This lowers student achievement and motivation to learn. In the last five years, Basic Science students' BECE outcomes have been low (NECO, 2016; & BSEB, 2017). Most failures have been linked to poor student exposure to activities, inadequate preparation, inability to comprehend questions, and ineffective science teaching techniques (Balarabe, 2016). Thus, having identified the use of inappropriate teaching method which is mostly the lecture method that have been found to be deficient in enhancing learning and achieving the objectives of Basic Science, as a contributing factor that may be responsible for students poor or unsatisfactory achievement in basic/elementary science. This study therefore hopes that the use of communication technology instructional intervention will improve students' Basic Science achievement.

There is no proof that ICT would boost students' achievement. They discovered, even in some instances, a persistently unfavourable and barely significant correlation between ICT usage. and student achievement (Leuven, Lindahl, Oosterbeek & Webbink, 2004). In addition, studies review on ICT effect on schools was done by Trucano (2005), and the outcome indicted that the effect is unclear. In contrast, some studies reported positive ICT effect on students' achievement (Castillo-Merino & Sjoberg, 2008; Sosin, Blecha, Agawal, Bartlet & Daniel, 2004). This poor or unsatisfactory achievement of students is also evident in elementary science and technology students Basic Education Certification Examination (BECE) in the last five years.

The of the overall curriculum objectives of the basic/elementary science and technology in addition to improve students' academic achievement cannot be attained without integration of the use of communication technology instructional intervention in Basic Science and Technology teaching-learning process. Hence, this paper seeks to examine the impact of communication technology instructional intervention on students' academic achievement.

RQs

- Is there any difference in the achievement mean of students instructed Basic/Elementary Science and Technology using communication technology instructional intervention and those instructed with the lecture method?
- Is there any difference between the achievement mean of male and female students instructed Basic/Elementary Science and Technology using communication technology instructional intervention?
- Is there any interaction effect of teaching method and sex on students' achievement in Basic/Elementary Science and Technology?

Hypotheses

- There is no significant difference in the achievement mean of students instructed Basic/Elementary Science and Technology using communication technology instructional intervention and those instructed using lecture method.
- There is no significant difference in the achievement mean of male and female students instructed Basic/Elementary Science and Technology with communication technology instructional intervention and those instructed with lecture method?
- There is no significant interaction effect between teaching method and sex on students' achievement in Basic/Elementary Science and Technology

Methodology

The paper adopted a pre-test - post-test quasi-experimental design shown in table 1 below. There was no randomization of subject as intact or regular classes were utilised and subjected to different treatment conditions. In support of this design, Borg and Gall (2007) stated that it is a suitable alternative to experimental design when randomization is not used or applied.

Table 1: Design model of the study

Group	Pre-test	Treatment	Post-test
CTII (Experimental)	O_1	X	O_2
Lecture method (Control)	O_3		O_4

The population of the study comprised 21,937 (11,906 female and 10,031 male) junior secondary school (JSS) students in the one hundred and seventy-nine (179) public secondary schools in Delta State (Delta State Ministry of Basic and Secondary Education, 2022). The junior secondary two (JSII) students were utilised for the study because the selected basic science concepts covered in the study were selected from JSII scheme of work. In addition, JSII students were used because they were readily available at the time of the study due to their non-involvement in external examination. Purposive/judgemental sampling techniques of schools with interment connectivity was used to sample two hundred and twenty-three (223) JSII Basic/Elementary Science and Technology students from four (4) public junior secondary schools in Delta State for the study. The purposive/judgemental sampling technique was based on: presence of ICT devices; experienced Elementary Science and Technology teachers with technological knowledge and skills and mixed secondary schools. Using these criteria, all the single sex schools and schools without Basic Science ICT devices were isolated from the study.

The experimental groups were instructed using Basic/Elementary Science and Technology topic/concepts with communication technology intervention (video) supplemented with email and students workbook activities derived from the subject matter covered by the study. The control groups were taught the same Basic/Elementary Science and Technology concepts with lecture method like the experimental groups. Both groups were taught for six weeks using research assistance. The study instrument was the Basic Science Achievement Test (BSAT) constructed by the researcher. The BSAT reliability was established using the Kuder-Richardson formula 21 which yielded a coefficient index of 0.77. Before treatment, both groups were administered the BSAT as pretest and after treatment which lasted for six weeks, the BSAT was re-administered to both groups as posttest. The data obtained were

analysed statistically using mean, standard deviation, t-test and ANCOVA. The hypotheses formulated were tested at the significance level of 0.05.

Results

RQ 1: Is there any difference in the achievement mean of students instructed Basic/ Elementary Science and Technology using communication technology instructional intervention and those instructed with the lecture method?

Table 2: Pretest and Posttest Achievement Mean of Students Instructed Basic/ Elementary Science and Technology with Communication Technology Instructional Intervention and Lecture Method

Group	N	Pretest $\underline{X}$	$\underline{X}$diff	SD	Posttest $\underline{X}$	$\underline{X}$diff	SD
CTII (Experimental)	120	28.63	1.39	5.95	66.88	11.23	9.26
Lecture method (control)	103	27.24		5.58	55.65		8.18

Table 2 shows that at pretest, students in the communication technology instructional intervention group had a achievement mean score of 28.63 while students in the lecture method group had an achievement mean of 27.24. The mean difference is 1.39 in favour of students in the communication technology instructional intervention group. This infers that both groups were not equivalent on the knowledge of Basic Science instructed before treatment. At posttest, the communication technology instructional intervention group obtained a higher achievement mean score of 66.88, while the lecture method group obtained an achievement mean score of 55.65. The mean gain or difference is 11.23 in favour of students in the communication technology instructional intervention group.

Hypothesis 1 (Ho_1): There is no significant difference in the achievement mean of students instructed Basic/Elementary Science and Technology using communication technology instructional intervention and those instructed using lecture method.

Table 3: t-test Comparison of Pretest Scores of Students Instructed Basic/Elementary Science and Technology with Communication Technology Instructional Intervention and Lecture Method

Group	N	$\underline{x}$	SD	df	t-cal.	Sig.(2-tailed)	Decision
CTII	120	28.63	5.95	221	1.791	0.075	**Not Significant**
Lecture method	103	27.24	5.58				

Table 3 shows that there is no significant difference in the achievement mean of students instructed Basic/Elementary Science and Technology using communication technology instructional intervention and those instructed using lecture method, t = 1.791, P(0.075) > 0.05. Hence, null hypothesis two was tested with t-test.

Table 4: t-test Comparison of Posttest Scores of Students instructed Basic/Elementary Science and Technology with Communication Technology Instructional Intervention and Lecture Method

Group	N	$\underline{x}$	SD	df	t-cal.	Sig. (2-tailed)	Decision
CTII	120	66.88	9.26	221	9.530	0.000	**Ho_2 is rejected**
Lecture	103	55.65	8.18				

Table 4 shows that there is a significant difference in the posttest achievement mean of students instructed Elementary Science and Technology with communication technology instructional intervention and those instructed with the lecture method, **t = 9.530, P(0.000) < 0.05**. Hence, null hypothesis two is rejected. Therefore, a significant difference existed in the achievement mean achievement of students instructed Elementary Science and Technology using communication technology instructional intervention and those instructed using lecture method, in favour of students instructed Basic/Elementary Science and Technology with communication technology instructional intervention.

RQ 2: Is there any difference between the mean achievement of male and female students instructed Basic/Elementry Science and Technology using communication technology instructional intervention?

Table 5: Posttest Achievement Mean of Male and Female Students Instructed Basic/ Elementary Science and Technology using Communication Technology Instructional Intervention.

Group	N	$\underline{x}$	SD	$\underline{X}$diff
Male	58	68.28	10.07	2.70
Female	62	65.58	8.30	

Table 5 shows that at posttest, the male students instructed Basic/Elementary Science and Technology with communication technology instructional intervention had an achievement mean of 68.28, while their female counterparts in the same group had a posttest achievement mean of 65.58. The mean gain or difference is 2.70, in favour of male students.

Hypothesis 2 (Ho_2): There is no significant difference in the achievement mean of male and female students instructed Basic/Elementary Science and Technology with communication technology instructional intervention and those instructed with lecture method?

Table 6: t-test of Posttest Mean of Male and Female Students Instructed Basic/Elementary Science and Technology with communication technology instructional intervention

Sex	N	$\underline{x}$	SD	df	t-cal.	Sig. (2-tailed)	Decision
Male	58	68.28	10.07	118	1.604	0.111	**Ho_2 is not rejected**
Female	62	65.58	8.30				

Table 6 indicates that there is no significant difference in the posttest mean of male and female students instructed Elementary Science and Technology with communication technology instructional intervention, t = 0.604, P(0.111) > 0.05. Thus, null hypothesis two is not rejected. Therefore, no significant difference

exists between the achievement mean of male and female students instructed Basic/Elementary Science and Technology using communication technology instructional intervention.

RQ3: Is there any interaction effect of teaching method and sex on the achievement of students' in Basic/Elementary Science and Technology?

Table 7: Interaction Effect of Teaching Method and Sex on Students' Achievement in Basic/Elementary Science and Technology

Groups	**Sex**	**N**	$\underline{X}$	**SD**
CTII	Male	58	68.28	10.07
	Female	62	65.58	8.30
		120		
Lecture	Male	41	58.10	6.86
	Female	62	54.03	8.62
		103		

Table 7 shows a posttest achievement mean of 68.28, for male students instructed Elementary Science and Technology with communication technology instructional intervention, while their female counterparts had a posttest achievement mean of 65.58. Male students instructed Basic/Elementary Science with the lecture method had a posttest achievement mean of 58.10, while their female counterparts had a posttest achievement mean of 54.03. The results do not suggest interaction effect of teaching method and sex on Basic/ Elementary Science and Technology students achievement. This is due to the fact that students had higher mean achievement scores in the communication technology instructional intervention group (experimental group).

Hypothesis 3 (Ho_3): There is no significant interaction effect between teaching method and sex on Basic/ Elementary Science and Technology students' achievement.

Table 8: ANCOVA Summary on Interaction Effect of Teaching Method and Sex on Basic/Elementary Science and Technology Students' Achievement

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	7631.243[a]	4	1907.811	25.391	.000
Intercept	32705.904	1	32705.904	435.279	.000
Pretest	12.207	1	12.207	.162	.687
Methods	6378.694	1	6378.694	84.893	.000
Sex	591.024	1	591.024	7.866	.005
Methods * Sex	33.220	1	33.220	.442	.507
Error	16380.021	218	75.138		
Total	872812.000	223			
Corrected Total	24011.265	222			

Table 8 shows that there is no significant interaction effect of teaching method and sex on students' achievement in Basic Science and Technology, **F(1, 218) = 0.442, P(0.507) > 0.05**. Therefore, the null hypothesis is not rejected. Thus, there is no significant interaction effect of teaching method and sex on achievement in Basic/Elementary Science and Technology.

Discussion

Effects of Communication Technology Instructional Intervention and Lecture Method on Achievement in Basic/Elementary Science and Technology

The study revealed significant effect of communication technology instructional intervention and lecture method on achievement of students' in Basic/Elementary Science and Technology. This is predicated on the significant greater posttest scores of all the students instructed Elementary Science and Technology with communication technology instructional intervention and lecture method compared to their pretest scores. It is inferred that the increased posttest scores earned by the students were not by chance but because of the treatment with the use of communication technology instructional intervention and lecture method. This suggests that the two-communication technology instructional intervention and lecture method have the capability to cause learning to occur though at varying degrees. This finding corroborates with Ghavifekr and Rosdy (2015) who reported out that technology based teaching and learning is more effective compare to traditional teaching method. Macho (2005) proved that using ICT in education would enhance students learning.

Effect of Communication Technology Instructional Intervention and Sex on Achievement in Basic/Elementary Science and Technology

The study revealed that there is no significant statistical difference between the achievement of male and female students instructed Basic or Elementary Science and Technology with communication technology instructional intervention. This suggests that communication technology instructional intervention enhance the achievement of both sexes in Elementary Science and Technology equally. This observation of the study may be predicated on the fact that ensures students' active participation irrespective of students' sex. In other words, communication technology instructional intervention ensured active participation by both sexes. This is in line with that of Ugwuanyi, Mwantok, Mbara & Ogbu (2018) who discovered that no significant variation or difference between male and female students success when instructed using ICT materials.

Interaction Effect of Teaching Method and Sex on Achievement in Basic/Elementary Science and Technology

The study again revealed that there is no significant interaction effect of teaching method and sex on students' achievement in Basic/Elementary Science and Technology. This implies that communication technology instructional intervention and lecture method did not combine with student sex to influence Basic/Elementary Science and Technology students' achievement. In other words, communication technology instructional intervention and the lecture method are not sex-biased relative to students' achievement in Basic Science and Technology. This finding agrees with that of Igori, Eru. Inalegwu & Ogom (2019) who found out that gender has no effect on performance of students in Chemistry when they are instructed with ICT and lecture method.

Conclusion

The study concludes as follows: Though communication technology instructional intervention and lecture method have significant effect on students' achievement in Basic/elementary Science, communication technology instructional intervention enhance students' achievement in Elementary Science and Technology more than the lecture method. Communication technology instructional intervention enhances male and female students' achievement in Basic/Elementary Science equally; communication technology instructional intervention and lecture method did not combine with sex to influence students' achievement in Basic/Elementary Science and Technology.

Recommendations

- Communication technology instructional intervention should be adopted by Basic/Elementary Science and Technology Teachers in the teaching of Basic/Elementary Science concepts at junior secondary school level.
- Government should provide ICT devices in secondary schools to enhance the implementation of communication technology instructional intervention.
- In-service training for teachers to acquaint them on the importance of communication technology instructional intervention should be organized by school administrators and other stakeholders in education.
- School administrators should provide alternative power supply when there is public power failure to schools to enhance communication technology instructional intervention implementation.

References

1. *Abah, C.O. (2013). Universal basic education for national survival: The place of primary and integrated science. Benue State University Journal of Education, 4(1), 163-170.*
2. *Abubakar, M. A., 2016. An Assessment of the Use of ICT in Teaching and Learning in Public Secondary Schools in North-eastern Nigeria. Unpublished MSc Thesis. Eastern Mediterranean University Gazimagusa, North Cyprus*
3. *Ada, N. A., & Okwu, E. J. (2001). Teachers' awareness of the roles of improvised materials in science teaching. Journal of Education, 3 (1 &2), 214 – 223.*
4. *Adeniyi, S. A. (2010). Re-engineering human materials resource for Universal Basic Education. Journal of National Association for Technical Teachers, 2 183 – 185.*
5. *Angrist, J. D., & lavy, V. (2002).New Evidence on Classroom Computers and Pupil Learning. Economic Journal, 112, 735-765.*
6. *Ajayi, V.O., & Ogbeba, J. (2017). Effect of gender on senior secondary chemistry students' achievement in stoichiometry using hands-on activities. American Journal of Educational Research, 5(8), 839-842.*
7. *Balaraba, M. (2016). Effects of psycho-social factors on the students' academic achievement in Basic Science. Journal of Research in Science Teaching, 5(1), 234-240.*
8. *Banerjee, A., Cole, S., Duflo, E., & Linden, L. (2004). Remedying Education: Evidence from Two Randomized Experiments in India.*
9. *BSEB (2016). Benue State examination board statistic unit reports on students' achievement in Basic Science in zone B of Benue State. Makurdi: BSEB*
10. *Castillo-Merino, D., & Sjoberg, M. (2008). A theoretical framwork for the economics of E-learning. RUSC, 5(1), 64-72.*
11. *Chickering, A., & Erhmann, S. C. (1996). Implementing the seven principles: Technology and Leve. AAHE Bulletin 87.*
12. *Chisalita, O. (2013). New Educational Literacies. Changes Brought by the Information and Communication Technologies (ICT's) in Education. Paper presented at the International Scientific Conference eLearning and Software for Education.*
13. *Enemarie, V. (2016). Achievement in basic science as a predictor of performance in senior secondary sciences in Benue Education Zone B. Unpublished M.Ed. Dissertation, Benue State University, Makurdi.*
14. *Enemarie, V., Ogbeba, J. & Ajayi, V.O. (2019). Students' Achievement in Basic Science in Basic Education Certificate Examination as a Predictor of their Performance in Biology in Senior Secondary Certificate Examination. Department of Curriculum and Teaching, Benue State University, Makurdi, Nigeria. Research Gate. A Discourse on Educational Issues, 281 – 295. www.researchgate.net*

15. *Fisher, A., Exley, K., & Ciobanu, D. (2014). Using technology to support learning and teaching. London: Routledge, Taylor & Francis Group.*
16. *Floyd, K. K., & Judge, S. L. (2012). The efficacy of assistive technology on reading comprehension for postsecondary students with learning disabilities. Assistive Technology Outcomes and Benefits, 8, 48–64.*
17. *Ghavifekr S. & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. International Journal of Research in Education and Science (IJRES), 1(2),275-191.*
18. *Heafner, T. (2004). Using technology to motivate students to learn social studies. Contemporary Issues in Technology and Teacher Education [Online serial], 4(1), 54-64.*
19. *Housand, B. C., & Housand, A. M. (2012). The role of technology in gifted students' motivation. Psychology in the Schools, 49, 706–715.*
20. *Igori, W., Eru. J. O., Inalegwu, O. & Ogom (2019): Effects of ICT on Students' Academic Performance in Science Education. IJSRM, December 2019, 19(2), 36-44*
21. *Jirgba, M. C. (2008). Attitude of science teachers towards the teaching of Integrated Science in Makurdi. An unpublished M.Ed. dissertation, Benue State University, Makurdi.*
22. *Khan, M. S., Khan, I., Siraj-u-Din, Ismail, H. M., Khattak, R., & Jan, R. (2015). The impacts of ICT on the students' performance: A review of access to information. Research on Humanities and Social Sciences, 5(1), 26-38.*
23. *Leuven, E., Lindahl, M., Oosterbeek, H., & Webbink, D. (2004). The effect of extra funding for disadvantaged pupils on achievement. Paper presented at the IZA Discussion Paper, Bonn, Germany:.*
24. *Maduabum, M.A. (2011). Strategies of improving the access of girls and women in Science, Technology and Mathematics (STM). University Education in Nigeria. Ebonyi Journal of Science Education, 1(1), 11-12.*
25. *Macho, S. (2005). Difference among standardized test scores due to factors of internet access at home and family affluence. West Virginia University: United states.*
26. *Mbaeze, I. C., Ukwandu, E., &Anudu, C. (2010).The Influence of Information and Communication Technologies on Students' Academic Performance. Journal of Information Technology Impact, 10(3), 129-136.*
27. *Ogunjobi, M. (2016). Comparison of the effectiveness of three instructional methods: Advance organizer, discover and invention or exhibition of acceptable laboratory behaviour. Journal of Vocational Science and Education Development, 6(18), 36 – 44.*
28. *Sosin, K., Blecha, B. J., Agawal, R., Bartlett, R. L., & Daniel, J. I. (2004). Efficiency in the Use of Technology in Economic Education: Some Preliminary Results. American Economic Review, May*
29. *Ugwuanyi, C. C., Mwantok, G. J., Mbara, S. O. & Ogbu, S. (2018): Efficacy of the use Information and Communication Technology (ICT) on students' Achievement in Geometry. AJSTME, 4(1), 148-156.*