



Effect Of Computer Animation And Peer Tutoring Methods On Students' Academic Achievement And Retention In Telecommunications In Colleges Of Education In North- East, Nigeria

¹Prof. I. Tumba, ²Prof. L. C. Ezugu & ³Babayo, A. S.

^{1,2}Department of Electrical Technology Education,
School of Technology and Science Education,
Modibbo Adama University, Yola, Nigeria

¹Email: ishayatumba.it@gmail.com/ 08086190619

²Email: livinusezugu@yahoo.com/ 08169636258

³Department of Electrical/Electronics,
School of Technical Education,
Federal College of Education (Technical) Potiskum, Yobe State, Nigeria
Babayoshanga75@gmail.com/ 08067246198

ABSTRACT

This study sought to assess the effect of computer animation and peer tutoring methods on students' academic achievement and retention in telecommunications in colleges of education in north-east, Nigeria. Especially the objectives of the study were to determine the academic achievement and retention of students in telecommunications when taught with computer animation and peer tutoring peer tutoring methods on experimental groups and lecture method on control groups. The study used quasi-experimental design which employed non-equivalent pre-test, post-test control group design. The instrument for data collection was Telecommunications Achievement and Retention Test (TART) which comprises of 50 questions that fell into the following four topics: Modulation technique and Needs for Modulation, AM and FM Modulation, Principles of Antenna and Radio Wave Propagation. Three validates validated the instrument. Two validates were from the department of Electrical Technology Education, Modibbo Adama University Yola, and one validate was from the department of Electrical Technology Education, Federal College of Education (Technical) Potiskum. The reliability of the instrument was assessed by using Kuder-Richardson Method (KR-21), having a reliability coefficient index of 0.78. The population of the study comprised of all the NCE III Electrical students of the two (2) participating colleges of education, because the effect of only two methods was examined. Therefore, forty three (43) students in Federal College of Education (Technical) Gombe and Twenty two (22) students in Federal College of Education (Technical) Potiskum which made up a total population of 71, for the 2021/2022 session. The entire population was used as a sample. The researcher met and sought the cooperation of the telecommunications teachers of the colleges who invariably accepted to serve as research assistants in the experiment. The research assistants were given a hard copy of the lesson note and the lessons plans. The data for the study was collected by the tutors after administering the instrument for the pretest prior the commencement of the experiment and for the posttest after the treatment was

completed within six weeks. Meanwhile, two weeks after the completion of the experiment, a retention test was also administered by the researcher with the help of research assistants. The Statistical Package for Social Sciences (SPSS) was used for analyzing the data. The findings of the study among which are: students taught telecommunications with computer animation had a higher mean achievement score than those students taught using the lecture teaching method in the achievement test. However, students taught telecommunications with computer animation had a low mean retention score than those students taught using the lecture teaching method in the test for retention of learning, Students taught telecommunications with peer tutoring had a higher mean achievement score than those students taught using the lecture teaching method in the achievement test. The recommendations of the study are among others; more attention should be accorded with peer tutoring teaching method in the colleges of education, technical teachers of telecommunications in north-east, Nigeria, should adopt the use of computer animation method to teach telecommunications, curriculum planners in National Commission for Colleges of Education (NCCE) should consider review of curriculum for telecommunications for colleges of education with a view to incorporating the computer animation and peer tutoring methods.

Keywords: Computer animation, Peer tutoring, Academic achievement, Retention, Telecommunications

INTRODUCTION

There is no sane country can afford to play around with her education and economic development. Technical education facilitates development rapidly in most countries of the world particularly, the developed countries. No nation can hope to develop and advance technologically without good pattern of inculcating individuals with relevant skills, knowledge. Enemuoh (2022) noted that a shift from teacher-centered instruction to learner-centered instruction is needed to enable students acquire the new 21st century knowledge and skills for learners' achievement and retention.

Students' academic achievement therefore, is the performance of students in a school subject as designated by a score or mark obtained in an achievement test. Achievement is quantified by a measure of the students' academic understanding in relation to those of other students of his/her age. According to Abubakar, *et al.* (2017) achievement is dependent upon several factors like instructional method, the learning environment, motivation as well as retention. While, Retention could be described as the ability to replicate the learnt concept when the need arises, as Limon (2022) stressed that, retention of learning refers to a repeated performance by a student earlier acquired, elicited after an interval of time. Therefore, the academic achievement of students in Telecommunications also depends on the retention capability of the students in the subject. Tatal (2021) confirmed that achievement in education is directly connected to knowledge retention.

Telecommunications is one of the courses that students offer in NCE III Electrical/Electronic technology in colleges of education in Nigeria. Telecommunications is a field of study that is both science and technology related. It is concerned with the ways in which the movement of electrons through space is controlled and manipulated (Chen, Chen and Xia, 2022). Its applications feature in radios, televisions, computers, aeronautics and other related equipment. The objectives of studying Telecommunications in colleges of Education (Technical) in Nigeria, according to National Commission for Colleges of Education (NCCE) Minimum Standard (2020) are for the students to learn: Microphones/Telephones, Modulation-Amplitude, Frequency and Phase modulations, Transmitter and Receiver principles, Television Principles, Antenna Principles and Radio wave Propagation. However, almost all the topics to be learnt by students in telecommunications are with the invisible internal operation that requires different methods in teaching the course for students to understand better. The way topics in telecommunications are taught appears to lack instructional procedure that creates interactive style. Augustine and Elizabeth (2021) noted that the implication is that the instructions are not logically sequenced to fit the ability of the learners as teachers could not provide teacher-led practice to engage in reciprocal teaching.

Many students finds it difficult to understand some concepts in electronic subject simply because its concept is abstract, such as propagation of radio signal in the form of electromagnetic wave to a far distance destination via a space link, movement of electrons and holes in a semiconductor, etc (Chen

(2020)). The influence of technological development has rendered traditional skills inadequate for work while creating the need for new and often sophisticated skills. Usman and Madudili (2020), noted that because most students get information via visual content sources like computer which are used in daily life very much, it is more difficult to teach students by lecture method. If principles of how students learn are taken into account, richness of the visual content makes instruction more lasting and effective. Usman and Madudili (2020), further mentioned that, one possible solution to these challenges is the use of computer assisted instructional teaching method. Computer animation refers to use of computer as a tool in teaching and learning. Computer Assisted Instruction (Computer animation) according to Adolphus and Omeodu (2020) is an interactive instructional method whereby a computer is used to present the instructional material. This implies that, Computer animation also allows students to have a pictorial understanding and build a mental model of complex concepts. Animations and diagrammatic representation helps to reduce the cognitive load on students and increases learning and information retention (Edgar, 2016). Therefore, animation supports teaching and learning process, helps students to understand abstract concepts and increases their motivation.

Moreover, Tumba and Chinda (2014) mentioned that, different methods of teaching expose students to active learning. In view of this, among the students-centered methods, this is peer tutoring. Peer tutoring is a teaching and learning method that uses students to act as tutors, as Kaleem, Ullah and Tabassum (2018), Tutoring is the process in which experts and trained people help and support other people who are less skilled and have low level of knowledge or expertise in an interactive meaningful organized way. Usually shy students learn effectively through tutoring by sharing their thoughts with classmates.

Therefore, there is need to explore the use of other (alternative) methods in teaching telecommunications in colleges of education, otherwise students' performance in the course might keep on declining, such that on graduation, they may not be able to contribute to the nations technological development. Thus the need to find out the effect of using Computer animation and Peer tutoring methods on students' academic achievement and retention in telecommunications in colleges of education in the north-eastern Nigeria arises.

Research Questions

The study sought to the following research questions

1. What is the mean score of students on achievement test in telecommunications when taught using the Computer animation and those with Lecture methods?
2. What is the mean score of students on achievement test in telecommunications when taught using the Peer tutoring and those with Lecture methods?
3. What is the mean score of students on retention test in telecommunications when taught using Computer animation and those with Lecture methods?
4. What is the mean score of students on retention test in telecommunications when taught using Peer tutoring and those with Lecture methods?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

Ho₁: There is no significant difference between the mean achievement scores of students taught telecommunications using Computer animation and those taught using Lecture method.

Ho₂: There is no significant difference between the mean achievement scores of students taught telecommunications using Peer tutoring and those taught using Lecture method.

Ho₃: There is no significant difference between the mean retention scores of students taught telecommunications using Computer animation and those taught using Lecture method.

Ho₄: There is no significant difference between the mean retention scores of students taught telecommunications using Peer tutoring and those taught using Lecture methods.

Theoretical Framework

The study used Dual Coding Theory of Visualization on Computer animation method. The theory is within the field of psychology that was introduced by Paivio in 1971 in his book imagery and verbal

processes. The theory stated that verbal and non-verbal information is processed separately. The theory explained that dual coding theory involved the activity of two distinct subsystems, a verbal system specialized for dealing directly with language and a nonverbal (imagery) system specialized for dealing with nonlinguistic objects and events. The theory postulated, that both visual and verbal information are processed differently and along distinct channels with human mind creating separate representations for information are used or organize incoming information into knowledge that can be acted upon, stored and retrieved for subsequent use (Paivio, 1971). Therefore, Paivio is the main architect of dual coding theory. Therefore, exposing students through computers to telecommunications with diagrams and texts will enable them to take greater advantage of their capability to process information on two levels, of stimulating the visual system, and by reducing the load placed on the verbal processing system, hence enhancing performance. The theory provided the basis for telecommunications students to effectively understand the subject and increase their retention ability.

Meanwhile, the study used Social Constructivism Theory on peer tutoring method and Psychoanalytic Theory of Play on play-way method. The social constructivism theory which was propounded by Vygotsky (1978). He stated that social interaction between teacher-students and student-students plays a fundamental role in learning. Teaching can be made more efficient when learners engage in activities within a supportive environment and receive guidance mediated by appropriate teaching methods (Pawlak, Derakhshan, Mehdizadeh and Kruk, 2021). Vygotsky emphasized the social nature of learning, and suggested the use of mixed-ability learning groups to promote conceptual change. He is of the opinion that teachers cannot simply give students knowledge; Students must construct knowledge in their own minds. The teacher can facilitate this process by teaching in ways that make information meaningful and relevant to students, by giving students opportunities to discover or apply ideas themselves, and by teaching students to be aware of and consciously use their own strategies for learning. Teachers can give students ladders that lead to higher understanding, yet the students themselves must climb these ladders. Suhendi, Purwarno and Chairani (2021) stressed that social constructivist sees learners must individually discover and transform complex information, checking new information against old rules and revising rules when they no longer work, This view has profound implications for teaching, as it suggests more active role of students in their own learning in order to comprehend and reproduce what they have learnt. Therefore, the use of peer tutoring in teaching telecommunications propels the teachers to be actively involved in providing their students with cognitive tools needed for continued growth by motivating them to construct their understanding in their peer teaching and learning social interaction by making them to be tutor and tutees.

METHODOLOGY

The study used quasi-experimental design which employed non-equivalent pre-test, post-test control group design. The target population of the study comprised of all the NCE III Electrical students of the two (2) participating colleges of education, because the effect of only two methods was examined. Therefore, forty three (43) students in Federal College of Education (Technical) Gombe and Twenty two (22) students in Federal College of Education (Technical) Potiskum which made up a total population of 65, for the 2021/2022 session and the entire population was used as a sample. The instrument used for data collection was Telecommunications Achievement and Retention Test (TART) which comprised of 50 questions that fell into the following four topics: Modulation technique and Needs for Modulation, AM and FM Modulation, Principles of Antenna and Radio Wave Propagation. Students' achievement and retention were assessed with test questions which were multiple choice objective questions with four options each, which were developed by the researcher. The questions were developed from the current minimum standard of Telecommunications of the colleges of education by the National Commission for Colleges of Education (2020).

The instrument was trial tested in College of Education Azare, since it was not part of the study, but was from the same region. The reliability was assessed by using Kuder-Richardson Method (KR-21), having a coefficient of 0.78 index of the instrument. The data was collected by the tutors after administering the Telecommunications Achievement and Retention Test (TART) for the pretest prior the commencement of the experiment and for the posttest after the treatment was completed within six weeks. Meanwhile, two weeks

after the completion of the experiment, a retention test was also administered by the researcher with the help of research assistants. The Statistical Package for Social Sciences (SPSS) was employed for analyzing the data. Mean and Standard deviation were used to answer the research question 1-4. The t-test was used to test the hypotheses 1-4.

RESULTS AND FINDINGS

Research Question 1

Table 1: Mean and Standard Deviation of Pre-test and Post-test Mean Achievement Scores of Students Taught using Computer Animation and Lecture Methods of Teaching in Telecommunications.

Variable	N	Pre-test		Post-test		Mean Gain
		X	SD	X	SD	
Teaching Method						
Computer Animation Method	27	15.56	3.76	33.67	6.89	18.11
Lecture Method	16	22.87	7.24	27.63	8.41	4.76

Key: N= Number of Students; X = Mean and SD = Standard Deviation

Results in Table one shows that the group taught using computer animation method had a pre-test achievement mean of 15.56 with a standard deviation of 3.76 and a post-test achievement mean of 33.67 with a standard deviation of 6.89. The difference between the pre-test and post-test mean was 18.11. The group taught using lecture method of teaching had a pre-test achievement mean of 22.87 with a standard deviation of 7.24 and a post-test achievement mean of 27.63 with a standard deviation of 8.41. The difference between the pre-test and post-test mean was 4.76. However, for each of the groups, the post-test means were greater than the pre-test means, the group taught using computer animation method has higher mean gain of 18.11. This indicates that computer animation method of teaching has more effect on students' achievement in telecommunications than the lecture method.

Research Question 2

Table 2: Mean and Standard Deviation of Pre-test and Post-test Mean Achievement Scores of Students Taught using Peer tutoring and Lecture Method of Teaching in Telecommunications.

Variable	N	Pre-test		Post-test		Mean Gain
		X	SD	X	SD	
Teaching Method						
Peer Tutoring Method	13	13.38	2.87	24.69	6.06	11.31
Lecture Method	9	12.11	2.42	21.22	5.95	9.11

Key: N= Number of Students; X = Mean and SD = Standard Deviation

Results in Table one shows that the group taught using peer tutoring method had a pre-test achievement mean of 13.38 with a standard deviation of 2.87 and a post-test achievement mean of 24.69 with a standard deviation of 6.06. The difference between the pre-test and post-test mean was 11.31. The group taught using lecture method of teaching had a pre-test achievement mean of 12.11 with a standard deviation of 2.42 and a post-test achievement mean of 21.22 with a standard deviation of 5.95. The difference between the pre-test and post-test mean was 9.11. However, for each of the groups, the post-test means were greater than the pre-test means, the group taught using peer tutoring method has higher mean gain of 11.31. This indicates that peer tutoring method of teaching has more effect on students' achievement in telecommunications than the lecture method.

Research Question 3

Table 3: Mean and Standard Deviation of Students' Achievement Scores and Test for Retention in Computer Animation and Lecture Methods of Teaching in Telecommunications.

Variable	N	Post-test		Test for Retention	
		X	SD	X	SD
Teaching Method					
Computer Animation Method	27	33.67	6.89	19.63	3.61
Lecture Method	16	27.63	8.41	23.56	7.45
Mean Difference		6.04		-3.93	

Key: N= Number of Students; X = Mean and SD = Standard Deviation

Results in Table three shows that experimental group taught telecommunications with computer animation method had a post-test mean achievement score of 33.67 and a mean retention score of 19.63 in the test for retention of learning, while the students in the control group taught telecommunications with lecture method had a post - test mean achievement score of 27.63 and a mean retention score of 23.56 in the test for retention of learning. The result therefore indicated that students taught telecommunications with computer animation method retained their learning less than those taught with the lecture teaching method.

Research Question 4

Table 4: Mean and Standard Deviation of Students’ Achievement Scores and Test for Retention in Peer Tutoring and Lecture Methods of Teaching in Telecommunications.

Variable	N	Post-test		Test for Retention	
		X̄	SD	X̄	SD
Teaching Method					
Peer Tutoring Method	13	24.69	6.06	20.23	5.12
Lecture Method	9	21.22	5.95	18.67	3.97
Mean Difference		3.47		1.56	

Key: N= Number of Students; X̄ = Mean and SD = Standard Deviation

Results in Table four shows that experimental group taught telecommunications with peer tutoring method had a post-test mean achievement score of 24.69 and a mean retention score of 20.23 in the test for retention of learning, while the students in the control group taught telecommunications with lecture method had a post - test mean achievement score of 21.22 and a mean retention score of 18.67 in the test for retention of learning. The result therefore indicates that students taught telecommunications with peer tutoring method retained their learning better than those taught with the lecture teaching method.

Hypothesis 1

Table 5: t-test Statistic of Difference between the Mean Achievement Scores of Students Taught Telecommunications with Computer Animation Method and Those Taught with Lecture Method.

Variables	N	Df	X̄	SD	t-cal	t-crit	Remarks
Comp, Animation Method	27	42	33.67	6.89	2.372	2.021	Reject
Lecture Method	16		27.63	8.41			

Key: N= Number of Students; X̄ = Mean and SD = Standard Deviation

Table five tested Research Hypothesis one. The t-test analysis in table five was carried out to test whether significant difference exists between the post-test mean academic achievement scores of telecommunications students when taught using Computer animation and lecture method of teaching. The result showed that there was significant difference in the post-test mean academic achievement scores of telecommunications students when taught using Computer animation and lecture method of teaching. Hence, the t-cal of 2.372 was greater than the critical value of 2.021 at 0.05 level of significance. The null hypothesis (H₀) was therefore rejected, that the effect of Computer animation method on students’ academic achievement was greater than the lecture method on students’ academic achievement in Telecommunications.

Hypothesis 2

Table 6: t-test Statistic of Difference between the Mean Achievement Scores of Students Taught Telecommunications with Peer Tutoring Method and Those Taught with Lecture method.

Variables	N	Df	X̄	SD	t-cal	t-crit	Remarks
Peer tutoring Method	13	21	24.69	6.06	-0.245	2.080	Accept
Lecture Method	9		21.22	5.95			

Key: N= Number of Students; X̄ = Mean and SD = Standard Deviation

Table seven tested Research Hypothesis one. The t-test analysis in table seven was carried out to test whether significant difference exists between the post-test mean academic achievement scores of telecommunications students when taught using peer tutoring and lecture method of teaching. The result shows that there was significant difference in the post-test mean academic achievement scores of telecommunications students when taught using peer tutoring and lecture method of teaching. Hence, the t-cal of -0.245 was less than the critical value of 2.080 at 0.05 level of significance. The null hypothesis (H_{01}) was therefore accepted, that the effect of peer tutoring method on students' academic achievement was slightly no difference from the lecture method.

Hypothesis 3

Table 7: t-test Statistic of Difference between the Mean Retention Scores of Students Taught Telecommunications with Computer Animation Method and Those Taught with Lecture Method.

Variables	N	Df	\bar{X}	SD	t-cal	t-crit	Remarks
Computer animation Method	27		19.63	3.61	-1.55	2.021	Accept
		42					
Lecture Method	16		23.56	7.45			

Key: N= Number of Students; \bar{X} = Mean; SD = Standard Deviation and Mthd = Method

Table seven tested Research Hypothesis three. The t-test analysis in table seven was carried out to test whether significant difference exists between the post-test mean academic retention scores of telecommunications students when taught using Computer animation and lecture method of teaching. The result showed that there was no significant difference in the post-test mean academic retention scores of telecommunications students when taught using Computer animation and lecture method of teaching. Hence, the t-cal of -1.55 was less than the critical value of 2.021 at 0.05 level of significance. The null hypothesis (H_{05}) was therefore accepted, hence, the difference between the two methods on students' retention did not exist.

Hypothesis 4

Table 8: t-test Statistic of Difference between the Mean Retention Scores of Students Taught Telecommunications with Peer Tutoring Method and Those Taught with Lecture Method

Variables	N	Df	\bar{X}	SD	t-cal	t-crit	Remarks
Peer tutoring Method	13		20.23	5.12	-1.077	2.080	Accept
		21					
Lecture Method	9		18.67	3.97			

Key: N= Number of Students; \bar{X} = Mean and SD = Standard Deviation

Table ten tested Research Hypothesis four. The t-test analysis in table ten was carried out to test whether significant difference exists between the post-test mean academic retention scores of telecommunications students when taught using peer tutoring and lecture method of teaching. The result showed that there was no significant difference in the post-test mean academic retention scores of telecommunications students when taught using peer tutoring and lecture method of teaching. Hence, the t-cal of -1.077 was less than the critical value of 2.080 at 0.05 level of significance. The null hypothesis (H_{04}) was therefore accepted, that the result showed there was no significant difference in mean retention scores of telecommunications students when taught using peer tutoring and lecture method of teaching.

Findings of the Study

The following findings emerged from the study based on the data collected and analyzed.

1. Students taught telecommunications with computer animation had a higher mean score than those students taught using the lecture teaching method in the achievement test.
2. Students taught telecommunications with peer tutoring had a higher mean achievement score than those students taught using the lecture teaching method in the achievement test.

3. Students taught telecommunications with computer animation had a low mean retention score than those students taught using the lecture teaching method in the test for retention of learning.
4. Students taught telecommunications with peer tutoring had a higher mean retention score than those students taught using the lecture teaching method in the test for retention of learning.
5. There was significant difference between the mean achievement scores of students taught telecommunications using computer animation and those taught using Lecture method.
6. There was no significant difference between the mean achievement scores of students taught telecommunications using Peer tutoring and those taught using Lecture method.
7. There was no significant difference between the mean retention scores of students taught telecommunications using computer animation and those taught using Lecture teaching method in the test for retention,
8. There was no significant difference between the mean retention scores of students taught telecommunications using Peer tutoring and those taught using Lecture teaching method in the test for retention,

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made;

1. More attention should be accorded with peer tutoring teaching method in the colleges of education.
2. Technical teachers of telecommunications in north-east, Nigeria, should adopt the use of computer animation method to teach telecommunications.
3. Further empirical studies should be carried out on the use of computer animation and peer tutoring methods for instructional purposes, on different subjects and at different levels to provide sound basis for the integration of computer animation and peer tutoring methods in Nigerian colleges of education.
4. Curriculum planners in National Commission for Colleges of Education (NCCE) should consider review of curriculum for telecommunications for colleges of education with a view to incorporating the computer animation and peer tutoring methods.
5. Since the findings of this study showed that students who were taught with computer animation and peer tutoring methods performed better than those whom were taught with the lecture teaching method, students should be aware of the impact of computer animation and peer tutoring methods to develop interest and emulate their teachers in the use of computer animation and peer tutoring methods.
6. Government should provide relevant equipment for computer simulation, projecting device for teaching telecommunications in all the colleges of education. .
7. Government should organize workshops in the use of computer animation to sensitize technical teachers on the use of computer animation method.

REFERENCES

- Abubakar, S. A. Ibrahim, Y. U., Audu, R. , Abubakar, M. I., Hadiza, A. S., Mohammed, E. & Afuwagi, U. M. (2017). Effect of Video-Based Anchored Instruction on Students' Achievement and Retention in Motor Vehicle Mechanics Work in Abuja and Niger States, Nigeria. *ATBU Journal of Science, Technology & Education*; 5(2) 91-99.
- Adolphus, T., & Omeodu, M. (2020). Effects of computer-assisted instruction on students' achievement in atomic and nuclear physics in Senior Secondary Schools in Rivers State. *GSC Advanced Research and Reviews*, 2(3), 001-008.
- Augustine, A. O., & Elizabeth, P. N. (2021). Modelling instructional strategies as an effective tool for economics students' academic achievement.
- Chen, D. (2020). *Elucidating the Mechanics Behind Light-and Elevated Temperature-Induced Degradation in Silicon Solar Cells* (Doctoral dissertation, UNSW Sydney).
- Chen, L., Chen, J., & Xia, C. (2022). Social network behavior and public opinion manipulation. *Journal of Information Security and Applications*, 64, 103060.

- Edgar, D. W. [2016], 'The Effects of Computer Animated Instruction upon Understanding of High School Students', *Southern Region Conference American Association for Agricultural Education*.
- Enemuoh, C. (2022). *Context-Responsive Learner-Centered Education in a Secondary School* (Doctoral dissertation, Walden University).
- Kaleem, M. Ullah, I. & Tabassum, R. (2018). Effect of Peer tutoring on the Academic Achievement of Students in the Subject of Biology at Secondary Level. *PhD Dissertation*, Irfan Ullah Northern University RabiaTabassum.
- Limon, M. R. (2022). Assessing knowledge and skills retention of junior high school students on food safety lessons using modified Kirkpatrick's model. *Food Control*, 135, 108814.
- National Commission for Colleges of Education (2020). *Minimum Standard for Colleges of Education*. Plot 829 Cadastral Zone AOI Ralph Shodeinde Street, Garki, Abuja.
- Paivio, A.G. (1971). *Imagery and Verbal Processes*. New York: Holt, Rinehart, and Winston.59
- Pawlak, M., Derakhshan, A., Mehdizadeh, M., & Kruk, M. (2021). Boredom in online English language classes: Mediating variables and coping strategies. *Language Teaching Research*, 13621688211064944..
- Suhendi, A., Purwarno, P., & Chairani, S. (2021). Constructivism-Based Teaching and Learning in Indonesian Education. *KnE Social Sciences*, 76-89.
- Tumba, I. & Chinda, P. D. (2014). Comparative Effect of Teaching Methods Used Teaching Skills in Radio, Television and Electronic Servicing. *American International Journal of Social Sciences*.
- Tutal, Ö. (2021). Flipped classroom improves academic achievement, learning retention and attitude towards course: a meta-analysis. *Asia Pacific Education Review*, 22(4), 655-673.
- Usman, Y. D., & Madudili, G. C. (2020). Assessment of the impact of computer assisted instruction on teaching and learning in Nigeria: A theoretical viewpoint. *International Journal of Education and Development using Information and Communication Technology*, 16(2), 259-271.
- Vygotsky, L. S. (1978). *Mind in Society: The Development in Higher Psychology Processes*, Philadelphia, Metloer Venture, 38-4.