



EFFECTS OF VIDEO INSTRUCTIONAL PACKAGE (VIP) ON SECONDARY SCHOOL STUDENTS INTEREST AND ACHIEVEMENT IN BIOLOGY IN MAKURDI METROPOLIS, BENUE STATE



Nwaokolo, Blessing¹, Agada-Shaibu Patience²

¹General Studies Unit, AFIT, Kaduna State, Nigeria.

²Department of Science Education, Joseph Sarwuan Tarka University, Makurdi, Benue State.

Received: September 14, 2023 Accepted: November 28, 2023

Abstract:

This study was designed to determine the effect of Video Instructional Package (VIP) on secondary school students' interest and achievement in Biology in Makurdi Metropolis, Benue State, Nigeria. Two research questions were asked and two hypotheses were formulated. The study adopted a quasi – experimental design of non – randomized pretest posttest control group type. The population of the study was 2,100 while the sample of 138 SS2 students was drawn from four secondary schools using multistage sampling technique. In each of the schools intact classes were randomly assigned to VIP and lecture method. Two instruments were used for data collection namely; Biology Interest Inventory (BII) and Biology Achievement Test (BAT). The instruments were validated by five experts, trial-tested and used for the study. The reliability of BII was determined using Cronbach Alpha and the coefficient obtained was 0.92 while Kuder-Richardson formula 20 (K-R20) was used to determine the reliability of BAT and the reliability coefficient was found to be 0.89 implying that the instruments were reliable enough for the study. Descriptive statistics of mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the research hypotheses at 0.05 alpha level of significance. The findings of this study revealed no significant difference in the interest rating scores of students taught Biology using VIP and those taught using lecture method. The finding also revealed that there is a significant difference in the achievement and retention of students taught Biology using VIP and those taught using lecture method. It was therefore recommended among others that Biology teachers should apply the technological ways of teaching like the use of VIP during the lesson to enable students to learn effectively.

Keywords:

Makurdi Metropolis, student interest, video instruction package, Benue State

Introduction

Background of the Study

Biology as a subject offered in secondary school is vital for national scientific and technological development (Nwagbo & Chukelu, 2011). Biology deals with the study of life and the growth of animals and their organization, drive and how they interconnect with each other and with their surroundings. Biology as a science subject enables students to acquire the knowledge to live effectively in the recent age of science and technology (Nwaokolo *et al.*, 2019). The knowledge of Biology is not restricted to the growth of the individual only, but for the development of the social, economic, and political goals of countries all over the world. The knowledge of Biology also equips individuals with skills such as problem-solving, communication, critical thinking, and objective reasoning ability to prepare them for workplace and self-sustainability in the world economy (FRN in Sakiyo *et al.*, 2018). Biology is a core subject in Nigeria secondary schools that is introduced to students at senior secondary school level as an introductory ground for human development, where career abilities are prepared, potentials thrilled. It is also a prerequisite for many fields of learning like biochemistry, pharmacy, nursing, agriculture, forestry, biotechnology, and many other areas (Umoke & Nwafor, 2014).

Despite the relevance of Biology in growth of the nation, society and individuals, analysis of school achievement in Biology examination results show that students have not improved in the achievement. According to Oguniwin *et al.*, (2015) very few numbers of students achieve better in

Biology examination compared with other subjects. This situation is particularly discouraging when we realize that the achievement of our nation in science and technology depends to a great extent on the mastery of the essential aspect of Biology as a branch of science, (Umoke & Nwafor, 2014). The poor achievement of secondary school students in Biology over the years may not be unconnected with the method of teaching used in our various secondary schools and other causes of poor achievement may include lack of interest and motivation on the part of the students, lack of qualified teachers among others (Nwagbo, 2009; Cimer 2012; Abidoye & Oguniyi, 2012; Sharma, 2013).

To address these challenges, the teacher's role needs to shift from that of the dispenser of knowledge to the initiator of learning. Therefore, it is high time teachers of Biology deviate in the methods/strategies used to teach Biology, so that students would be able to learn more, recall more, and apply what they learn in society. Notwithstanding, the instructing of Biology with innovative strategies like video instructional package can be used to overcome learning complications and to eradicate misconceptions in Biology, and make Biology learning more effective (Oren, Ormana, Karatekin & Erdem, 2010; Cimer, 2012).

The usage of a Video Instructional Package (VIP) to teach Biology is a step of exploiting the available technology (Perry, 2013). VIP is one of the most diversify and powerful virtual learning mediums that captures and presents information and offers a sensory learning

environment that enhances learners to understand more and retains information better (Fern, Givan, & Siskind, 2011). VIP can increase students' creativity and cooperation. It can also help motivate students and create interest and a distinctive context for their learning experience (Mendoza, Caranto, & David, 2015). The use of VIP also brings real-world experience to the classrooms; it conveys a sense of immediacy and a feeling of participation (Chinna & Dada, 2013). Several studies show that VIP can enhance interest and improve learning compared to lecture method of teaching that do not make use of video (Gialenn, Lawrence, & Juanjose, 2015; Gambari, Shitu, Daramola & Jimoh, 2016; Mynbayeva, Sadvakassou & Akshalova, 2017).

VIP can be used to enhance the achievement and interest of students in the Biology classroom and interest is one of the most crucial factors in learning Biology. Interest plays a uncountable role in the field of psychology as some recent research works have found that it is closely related to behaviour, inspiration, reasoning, growth, feeling, vocations, aesthetics, behavior, hobbies, reasoning, and information processing (Silvia, 2009). Interest is often believed as a process that contributes to learning and achievement. Interest in Biology could be evident from the way students are attending classes regularly, copying notes and doing an assignment, paying attention in class work, as well as taking delight in observing and exploring the environment. Agwagah, (2010) asserts that students with low interest in a subject are low achievers while those with high interest in a subject are high achievers. When student's interest increases, understanding becomes enhanced (Gilakjani, 2012). Therefore, students' interest in Biology could support achievement. The study carried out by Gilakjani (2012) suggested that there is a relationship between interest and instructional strategy and also interest and achievement, and it is also possible to predict achievement from interest ratings. Based on the above-mentioned, the prominence of students' interest in learning Biology cannot be over-emphasized in enhancing achievement. It is against this background that the present study seeks to test the effect of VIP on secondary school students' interest and achievement in Biology.

Objective of the Study

The purpose of this study is to determine the effect of VIP on secondary school students' interest, achievement, and retention in Biology. Specifically, the study seeks to;

1. Determine whether the use of VIP will improve students' interest in Biology.
2. Determine whether the use of VIP will improve students' achievement in Biology.

Research Questions

The following research questions were raised to guide the study:

1. What are the mean interest ratings of students taught Biology using VIP and those taught using lecture

method?

2. What are the mean achievement scores of students taught Biology using VIP and those taught using lecture method?

Statement of Hypotheses

The following hypotheses were formulated for the study and tested at 0.05 level of significance:

1. There is no significant difference between the mean interest ratings of students taught Biology using VIP and those taught using lecture method.
2. There is no significant difference between the mean achievement scores of students taught Biology using VIP and those taught using lecture method.

Methodology

Research Design

A quasi-experimental design, specifically the non-equivalent control group design was employed in this study. Quasi-experimental design is considered appropriate for the study because intact classes were used to avoid disruption of normal class lessons. It was also considered appropriate because it establishes a cause-effect relationship between the independent variable (strategies) and the dependent variables (interest and achievement).

The design is represented symbolically thus:

E	O ₁	X	O ₂	O ₃

C	O ₁	-	O ₂	O ₃

Where O₁ and O₂ are pre and post achievement tests

E = Experimental Group; C = Control Group

O₃ = interest for both groups

X = Treatment

The Study Area

The study was carried out in Makurdi Metropolis in Benue State. Makurdi Metropolis is situated in the North Central geo-political zone of Nigeria. The town is linked with the Northern and Southern parts of Nigeria. Makurdi Metropolis is bounded on the North by Guma, in the East by Tarka, in the South Gwer, and in the West by Gwer West Local Government Area. There are twenty-five post-primary schools in the area and five tertiary institutions which include, Nigerian Open University, Federal University of Agriculture Makurdi Benue State, Benue

State University, College of Advanced and Professional Studies, and School of Nursing (Benue State Ministry of Education, 2015).

Makurdi is chosen because of the poor achievement of students in Biology in the area (see appendix A). Makurdi Metropolis also has the largest number of teachers and students in the state and it is believed that it will have the necessary required equipment to facilitate the study.

Population of the Study

The population of the study is 2,100 Senior Secondary School II (SS II) students in Makurdi Metropolis (Benue State Ministry of Education, 2020). The SS II students are used because they The choice of SSII is because genetics is taught in the SSII curriculum by the Federal Ministry of Education and it is the class for WAEC. These examination bodies are standardized achievement measuring bodies.

Sample and Sampling Technique

The sample of this study is 138 SS II students. A multi-stage sampling technique was employed to select the sample for this study. The multi-stage sampling technique would enable the researcher to make use of more than one sampling technique and was done in stages to select the sample for the study. Firstly, Purposive sampling was used to select four schools from the twenty-five schools. The schools was chosen based on the following criteria;

- They are co-educational,
- They have a projector that is made available for teachers' use,
- The students and teachers are computer literate,
- The willingness of the school management to permit the use of school facilities and students.

Also, the simple random sampling technique was used. Four schools were randomly picked from the secondary schools in Makurdi Metropolis. In each of the schools, an intact SS II class was used for the study. Two of these intact classes were assigned by balloting as the experimental groups and were taught using the VIP while the other which is the control groups were taught using the lecture method.

Instruments for Data Collection

Three instruments constructed by the researcher were used for data collection in this study. The instruments are Biology Interest Inventory (BII), Biology Achievement Test (BAT), and Biology Retention Test (BRT), was used for data collection.

Biology Interest Inventory (BII)

The BII is a (32) item interest scale constructed by the researcher. The BII was used to determine the students' interest level before treatment and after the treatment. The instrument BII is a 4-point scale bearing Strongly Agree (SA) (4 points), Agree (A) (3 points), Disagree (D) (2

points), and Strongly Disagree (SD) (1 point). (see appendix B).

Biology Achievement Test (BAT)

The academic achievement of SS II students in Biology is to be measured using BAT developed by the researcher for the study. The BAT content was taken from the Federal Government of Nigeria-approved curriculum for the SS II class. The BAT is 40 items test on the genetic concept. The 40 items are multiple-choice objective questions with four options (A, B, C, D,). Each correct answer in the test was scored one mark (1mark). The BAT was administered to students as pre-test and post-test. BAT was designed to assess students' achievement in the Biology topics used for the study. The time allowed for the test was 2 hours. A marking scheme was prepared and was used to score the test.

Video Instructional Package (VIP)

The treatment instrument, Video Instructional Package (VIP) on genetic, was a self-instructional package (contained buttons placed on the bottom of each page, such as **Play**, **Stop**, **Pause**, **Next** and **Previous** to provide easier control of the package) that lasted for four weeks. The videos used are in the form of an educational video Package from YouTube that is stored in a CD-ROM and was shown to students with the aid of a projector. The package contained six lessons based on topics in genetic.

Validation of the Instrument

The instruments were validated by five specialists, two from the Department of Science Education and one from the Department of Educational Foundations (Psychology) from the University of Agriculture Makurdi, Benue State, and two Biology teachers for face and content validity. The selection of this panel of experts was based on their knowledge in Biology education and evaluation. The experts were asked to check for appropriateness of the items, construction and structure of the questions, clarity of the questions and option and scope/coverage of the questions. The constructive criticisms of validators were used. The corrected version of the items of instruments was used for trial testing. Then the psychometric indices were used to assemble the final BAT

Reliability of the Instrument

A trial test was carried out in Model secondary School, Benue State which is a co-educational school that will not participate in the study, and 40 SS II students were used for the trial-testing. Trial testing aimed to determine the internal consistency of the items. For the BII, an internal consistency reliability coefficient of 0.92 (Appendix M.) was determined for the instrument using the Cronbach alpha formula. For the BAT, the reliability was determined using Kuder-Richardson formula 20. An internal consistency reliability index of 0.89 (Appendix K. page 142) was determined. The reliability coefficient shows that the items in both (BII & BAT) are reliable.

Method of Data Collection

To effectively test the hypotheses for this study, BII and BAT was administered in each of the two schools used for the study. The researcher and the research assistants administered the pretest (BII and BAT) to all SS II Biology students in the two schools before the treatments, thereafter, the two research assistants taught the genetic concepts. The teaching period lasted for four weeks after which a post-BII and BAT was administered.

Data Analysis Techniques

The mean and standard deviation of the students' scores in the test was used to answer the research questions, to determine the level of observed differences while the hypotheses was tested at 0.05 level of significance using analysis of covariance (ANCOVA). ANCOVA was considered suitable because the study involved two independent variables (instructional strategies and gender), a dependent variable (post-test scores) and a covariate (pre-test scores). ANCOVA was also preferred for its power to take care of initial differences across group since intact classes were used for the study as well as increased the precision due to extraneous variables thus reducing the error variance.

Results and Discussion

This section deals with the presentation of results and discussion of findings

Presentation of Results

Research question 1: What are the mean interest ratings of students taught Biology using VIP and those taught using

Table 2: Result of ANCOVA on Interest Rating Scores for Students Taught Biology Using VIP and Lecture Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	31018.848 ^a	2	15509.424	97.945	.000	.592
Intercept	2977.418	1	2977.418	18.803	.000	.122
PREECINTR	30849.114	1	30849.114	194.817	.000	.591
METHODECI	183.585	1	183.585	1.159	.284	.009
Error	21377.123	135	158.349			
Total	849788.000	138				
Corrected Total	52395.971	137				

a. R Squared = .592 (Adjusted R Squared = .586)

Table 2 presents the report on the effect of VIP on students' interest in Biology. The Table reveals $p = .284$, since $p = .284 > 0.05$, where 0.05 is the level of significance for the study. The null hypothesis that there is no significant difference in the interest rating scores attained by students exposed to VIP and lecture method group was therefore accepted.

Research Question 2: What are the mean achievement scores of students taught Biology using VIP and those

taught using lecture method? The answer to this question is presented in Table 3:

Table 1: Mean and Standard Deviations of Interest Ratings of Students in the Experimental and Control Group

Group	N	Pre-BII \bar{X}	S.D
Experimental	78	75.62	16.28
Control	60	67.08	18.98
Mean diff.			
Total	138		

In Table 1, the mean interest rating scores of students in the post-BII of the experimental and control groups are 76.99 and 72.72 respectively with their standard deviations as 21.14 and 17.06. The mean difference between the interest rating scores of the experimental and control groups from the post-BII is 4.27 and the mean gain of the two groups is 4.27. It could be seen that students taught using VIP improved on their interest in genetics more than those taught using the lecture method.

Hypothesis 1: There is no significant difference between the mean interest ratings of students taught Biology using VIP and those taught using lecture method. The result of this hypothesis is presented in Table 2

taught using lecture method? The answer to this question is presented in Table 3:

Table 3: Mean and Standard Deviations of Achievement Scores of Students in the Experimental and Control Group

Group	N	Pre-BAT \bar{X}	S.D	Post-BAT \bar{X}	S.D	Mean gain
Experimental	78	20.99	4.21	34.65	3.17	13.66
Control	60	19.17	4.14	23.99	5.27	4.82
Mean diff.		1.82		10.66		8.84
Total	138					

In Table 3, the mean achievement scores in post-BAT of the experimental and control group are 34.65 and 23.99 respectively with their standard deviation of 3.17 and 5.27. The mean difference between the mean achievement scores of the experimental and control group from post-BAT is 10.66 and the mean gain is 8.84. The result shows that the students taught Biology had a higher mean achievement score than the students taught Biology using lecture method. However, hypothesis two will be tested to determine if this finding is significant.

Hypothesis 2: There is no significant difference between the mean achievement scores of students taught Biology using VIP and those taught using lecture method. The result of this hypothesis is presented in Table 4

Table 4: Result of ANCOVA of Achievement Scores for Students Taught Biology Using VIP and Lecture Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3875.858 ^a	2	1937.929	109.185	.000	.618
Intercept	4352.255	1	4352.255	245.212	.000	.645
PREVIPCO	14.524	1	14.524	.818	.367	.006
METHODS	3589.334	1	3589.334	202.228	.000	.600
Error	2396.113	135	17.749			
Total	130592.000	138				
Corrected Total	6271.971	137				

a. R Squared = .618 (Adjusted R Squared = .612)

Table 4 presents ANCOVA report on the effect of VIP on students' achievement in Biology. The Table revealed $p=0.00$, since $p=0.00 < 0.05$, the study revealed that the difference found between the experimental and control group in Table 3 was significant in favour of the experimental group. The null hypothesis of no significant difference in the mean achievement scores attained by the students exposed VIP and lecture method in Biology was not accepted.

Discussion of Findings

The data presented in Table 1 provided the answer to research question one. The students taught Biology using the VIP had a mean interest rating score of 76.99 while those students taught using the lecture method had a mean interest rating score of 72.72. The finding revealed that VIP and lecture method are effective for improving students' interest in Biology, but those taught Biology using VIP has higher interest rating score compared to those taught using lecture method. The reason for the high-interest rating score of students taught Biology using VIP may be due to the video that the students are exposed to which is one of the technological ways of instruction. Videos can motivate and enhance the engagement of students thereby improving interest and meaningful learning in Biology. This is in line with the finding of Perry, (2013) which reported that learning Biology can be enhanced with video. Researchers

like Omiola *et al*, (2012); Chinna and Dada (2013), all agreed that the use of video to instruct enhances the interest of students. Analysis of covariance was used to test hypothesis one, Table 2, revealed that a significance of 0.284 at 0.05 level of confidence was obtained. This confirmed that there is no significant difference between the mean interest scores of students taught using VIP and those taught using lecture method. This finding varies with the result of Aiyedun (2020) which indicated that there is a significant difference in the mean interest rating score of students taught with animation teaching strategy than those taught using conventional teaching method. The reason for this variance in both findings could be attributed to the differences in the nature of the schools and the quality of the teachers used for the studies.

Results in Table 3 showed that students in the experimental group had a higher post-test achievement score of 34.64 in

Biology than their control counterparts with a post-test of 23.99. This is evidenced by the mean difference of 10.66 and the mean gain of 13.66 for the experimental group which is higher than 4.82 of the control group. This result is further confirmed in Table 4, which indicates that method is a significant factor in the achievement of students in Biology. This is shown by the rejection of the null hypothesis of no significant difference in the achievement scores of students taught using VIP and those taught using the lecture method. This indicates that students taught with VIP achieved better than those taught using lecture method of teaching. The reason for the higher achievement of the experimental group is that the students were motivated to learn by the use of VIP, which made them to be more engaged in the learning process. These results also affirm the fact that the use of innovative and technological base teaching strategies such as VIP aids students' learning; improves their achievement and enhances their performances. This is because VIP fosters the visualization and active cognitive processing of abstract information due to its feature that combine word, text, pictures, and videos. The finding of this study is supported by earlier findings of Omiola, Enuwa, Awoyemi, and Bada, (2012); Chinna and Dada (2013) and Nwobasi & Nwani (2020) who carried out investigations on students' achievement using videos and conventional method and found out that, students taught using videos performed better than those in conventional method group. This indicates that high achievement in a subject could be achieved through the instructional strategies adopted by the teacher. Also, Gialenn, Lawrence, & Juanjose (2015); Gambari, Shitu, Daramola & Jimoh (2016); Mynbayeva, Sadvakassou & Akshalova, (2017) buttressed this fact in their study and posited that the use of video enhances students' understanding of concepts than the conventional/traditional method of teaching. This implies that the use of VIP can be adopted as a strategy for effective teaching of Biological concepts since the students are actively engaged in the learning process.

Conclusion

Based on the findings, the following conclusion was drawn. That using VIP in teaching Biology concept was found more effective than the lecture method. This is because the use of VIP improved students' achievement and are permitted to actively engage in the learning process than the lecture method which was passive and teacher-centered. Further analysis showed that there was no significant difference in the mean interest rating scores of students exposed to VIP and their counterparts using lecture method. This could be a result of the quality of the teacher used for the study.

Recommendations

The following are the recommendations made based on the findings of this study:

- Biology teachers should apply the technological ways of teaching like the use of VIP during the lesson to enable students to learn effectively.
- Policy decisions should be made by education

stakeholders to ensure that VIP form an integral part of the curriculum for Biology at secondary schools.

References

- Abidoye, J. A & Oguniyi, S. O. (2012). Availability and utilization of instructional materials as factors of students Academic performance in Geography in Ondo State Secondary Schools. *Nigeria Journal of Research and Production*, 20 (1): 37-44.
- Agwaga, R. U. (2010). Differentiated instruction implications for UDL implementations. National Centre for General Curriculum. <http://www.kSaclescenter.traininresource/udl/diffinstruction.asp>
- Aiyedun, T. G. (2020). Effect of animation teaching strategy on secondary school students' achievement, retention and interest in climate change in Lokoja, Kogi State. *International Journal of Trend in Scientific Research and Development (IJTSRD)*, 4(3): 944-949.
- Chinna, N. C. & Dada, M. G. (2013). Effects of developed electronic instructional medium on students' achievement in Biology. *Journal of Education and Learning*, 2(2): 1-7.
- Cimer, A. (2012). What makes biology learning difficult and effective: Students' views. *Educational Research and Reviews*, 7 (3): 61-71.
- Fern, A., Givan, R. & Siskind, J. M. (2011). Specific-to-general learning for temporal events with application to learning event definitions from video. *International Journal of Physical Sciences*, 17: 379-449.
- Gambari, A. I., Shittu, A. T., Daramola, F. O. & Jimoh, M. A. (2016). Effects of video instructional packages on achievement of Senior Secondary School Students In Mathematics In Minna, Nigeria. *Journal of Science, Technology & Education (JOSTE)*; 4 (2):179-192
- Gilakjani, A. P. (2012). The significant role of multimedia in motivating EFL learners' interest in English language learning. *IJ.Modern Education and Computer Science*, 4. Retrieved July 29, 2019 from <http://www.mecspress.org/ijmecs/ijmecs-v4-n4/IJMECS-V4-N4-8.pdf>
- Mendoza, G. L., Caranto, L. C. & David J. T. (2015). Effectiveness of Video Presentation to Students' Learning *International Journal of Nursing Science*, 5(2): 81-86.
- Mynbayeva, A., Sadvakassova, Z. & Akshalova, B. (2017). *Pedagogy of the Twenty-First Century: Innovative Teaching Methods, New Pedagogical Challenges in*

- the 21st Century. Contributions of Research in Education, retrieved 16/11/2019 from: <https://www.intechopen.com/books/new-pedagogical-challenges-in-the-21st-century-contributions-of-research-in-education/pedagogy-of-the-twenty-first-century-innovative-teaching-methods>
- Nwagbo, C. and Chukelu, U. C., (2011). Effects of Biology Practical Activities on Students' Process Skill acquisition. *Journal of Science Teachers Association of Nigeria (JSTAN)*, 2(3): 3-7.
- Nwagbo, C. R. (2009). Effects of two Teaching Methods on the Achievement in and Attitude to Biology of Students of Different Levels of Scientific Literacy. *International Journal of Educational Research* 45 (3): 216-229.
- Nwaokolo, B., Adejoh, M. J., & Okwara, O. K. (2019). Comparative Effects of Individualized and Cooperative video-Based Instructional Strategies on Secondary School Students' Achievement in Biology in Makurdi Metropolis, Benue State, Nigeria. *International Journal of Social Science and Human Research*, 2(1): 1-8.
- Nwobasi, C. S. & Nwani, P. O., (2020). Videotape Instructional Package And Its Effect on Students' Achievement and Retention of Concepts in Chemistry At Secondary Schools *International Journal of Research Science & Management*, 7(10):1-9.
- Ogundiwin O. A., Asaaju O. A., Adegoke A. I. & Ojo A. T. (2015). Effect of Group Investigative Laboratory Strategies on Students' Achievement in Biology *Pyrex Journal of Research in Environmental Studies* 2(4): 035-041
- Omiola, M. A., Enuwa, M. R., Awoyemi, S. O. & Bada, A. A. (2012). Effect of developed video instructional package on the performance of senior secondary school Physics students in Ilorin Metropolis. *British Journal of Science*, 6(1): 45-53.
- Perry, M. J. M. (2013). Effects of visual media on achievement and attitude in a secondary Biology classroom. A master's Research Project Presented to the Faculty of the Patton, College of Education and Human Services, Ohio University. Pp. 112-119.
- Sakiyo, J., Aishatu, A. M. & Kanu, W. (2018). Multimedia Instructional Strategy and Secondary School Students' Academic Achievement in Biology. *Journal of Scientific and Engineering Research*, 5(2): 73-80.
- Sharma, P. (2013). Roles of interactive multimedia for enhancing students' achievement and retention. *International Journal of Distance Education*, 2(3): 12-22.
- Silvia, P. I. (2006). Exploring the Psychology of Interest. Retrieved October 1, 2019 from <http://psycnet.apa.org/psycinfo/2006-03939-000>
- Umoke, J. C. & Nwafor, C. C. (2014). Effects of instructional simulation on secondary school students' achievement in biology. *Journal of Education and Practice*, 5(19): 34-40.