

Video Instructional Strategy on Biology Student's Academic Performance in Port Harcourt, Nigeria

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Abstract: *The study investigated the efficacy of Video Instruction as a teaching strategy on Senior Secondary Schools Biology Students' academic performance in Port Harcourt, Rivers State. The study adopted pretest, post-test, control group quasi-experimental design. Two Intact classes were taught using video instructional strategy as experimental group and another two classes taught using Instructional Diagrams as control group. Two research questions and two hypotheses were formulated to guide the study. Biology Performance Test on Genetics (BPTG) with 25 Objective items was developed and validated. Pilot test was carried out with reliability coefficient of 0.76 obtained, before using it for data collection. The instrument was administered as pre-test and latter reshuffled and administered as post-test. The data were analyzed using mean and standard deviation to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The result revealed that the experimental group obtained higher mean performance score and no significant difference existed between location and academic performance. It is therefore, recommended that teachers should use video instructional strategy in the teaching and learning of sciences as it promotes internalization of abstract concepts.*

Keywords: *video, diagrams, instruction, biology, performance*

I. Introduction

Biology is one of the science subjects which prepare the learner in the senior secondary level of education for further careers in many areas of study in the higher institution. University Matriculation Examination Brochure (2017) clearly positioned Biology as a vital science subject, a prerequisite subject in further studies in Medicine, Dentistry, Agriculture, Pharmacy, teaching, Genetics Engineers, Microbiology, Biochemistry, Veterinary, Nursing and Biotechnology. Admin (2018) stated that it is a science subject that enables students to acquire the knowledge to live effectively in the modern age of science and technology. This is in agreement with Ibekwe (2017) which said that Education is the key that unlocks the door to modernization.

In spite of the importance and popularity of Biology among Nigerian students their performances at Senior Secondary School level have been poor (Opara, 2011). Over the years there has been high enrolment of Biology students in our secondary schools but interestingly, students' performance has not been encouraging. It is worrisome to note that the performance of these students have continued to deteriorate year after year in Biology despite all stake holders' efforts. This calls for investigation among the goals of science education, biology curriculum and instruction. The West African Examinations Councils (2016) annual reports revealed poor performances of most candidates who took the Senior School Certificate Examination. On the average the percentage failure is higher compared to the percentage rate of pass on the subject.

The current method of teaching Science subjects has been identified by Afolabi (2019) as one of the factors responsible for the poor performance of students towards science subjects. The conventional teaching method is classroom-based and consists of lectures and direct instructions conducted by the teacher. This teacher-centered method emphasizes learning through the teacher's guidance at all times, students are expected to only listen and learn from the teacher. The persistent use of this method makes students passive rather than active learners. It does not promote insightful learning and long-term retention of some abstract concepts in Biology (Umar, 2012). These problems have made science educators to focus on how to improve the teaching and learning of Biology with the view to arousing students' interest in the subject and also develop positive attitude in them so as to change this ugly situation.

In this present technology driven age, the teaching of science which forms the basis for scientific and technological growth of any nation requires dynamic and qualitative teaching methods that are computer oriented. The use of instructional video may enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills and by enhancing teacher training. Miranda (2001) in his work 'Effective Teaching Method' stated that effective teachers employ all the senses of students, find contemporary ways to use information technology to engage students through interaction and questions. Onasanya, Shehu, Ogunlade and Adefuye (2010) maintained that the global acceptance of ICT has been the landmark of educational system because Computer-Assisted Instruction has revolutionized teaching and learning of science by providing information and instructional activities a learner needs to master concepts.

Due to the increasing portability of technology devices, young children have recently developed internet addiction, However, the concern is not whether these children access the Internet, the concern is on what they actually do online, the time they spend on it, how their online activities affected and shaped their lives, and the economic impact of their online activities (Abdullahi, Nasiru and Shamsudeen, 2019). However, simple and new technologies can greatly increase students' engagement outside of the classroom, prepare them for real discussions by providing content and assessment before class time. Hence, it is essential that teachers use instructional guide which ensures students' active involvement in learning and provide suitable learning environment to improve performance.

"The use of video in learning is not a new phenomenon; according to Cruse (2007) filmstrips were first studied during World War II as a training tool for soldiers. Educators have recognized the power of audio-visual materials to capture the attention of learners, increase their motivation and enhance their learning experience. Technology has developed over the time, thereby increasing the availability and the use of audio-visual materials in classrooms. Nowadays, both adolescents and children are used to seeing dozens of videos daily; it is their basic channel of communication and they are already in the habit of using videos as sources of information (Admin, 2019). Pandey (2018) claimed that there are 22 billion daily video views: Snapchat (10 billion), Face book (8 billion), and YouTube (4 billion). He maintained that Viewers retain 95% of a message when they watch it in a video, compared to 10% when reading it in a text. Abubakar (2015) corroborating with the view maintained that learners are more likely to retain and recall contents that are presented visually with a greater percentage than what they hear only. The visual dimensions added to the learning material concretize learners' experiences. Cruse (2007) in his assertion stated that this generation truly is the media generation, devoting more than a quarter of each day to media. As media devices become increasingly portable, and as they spread even further through

young people's environments, anything that takes up this much space in young people's lives deserves full attention."

"Video-based learning is the term used to designate knowledge or skills acquired by being taught via video (Arunima, 2017). It uses presentation modes, such as verbal and pictorial representations. Video-based learning according to Abubakar (2015) is the production of video programmes directed towards helping students to achieve specific instructional objectives with a specific target population. They could be employed in topics where teacher find it difficult to carry out practical. Pandey (2018) stated that videos are popular choice for learners of all profile because they are high-impact medium and extension of video-based learning create engaging learning experience with high recall and retention. One of the critical attribute of video as stated by Arunima (2017) is the use of both auditory and visual cues. Visual symbols provide primary source of information and the audio symbols are utilized to elaborate information. Four major factors that come into play for effective learning as stated by Arunima (2017) are attention, relevance, confidence, and satisfaction. Video-based learning has the ability to provide all these attributes and thus supports effective learning."

The Researcher as a youth counselor has observed that many students spend most of their time to watch video films and engage in long conversation with their friends using handsets and computers. They have much interest in the present day technological tools to watch those things that are appealing to their sight. If therefore, teachers that are the facilitators of knowledge can capitalize on this to redirect their teaching using Video Instructional strategies, there may be better results.

II. Review of Literature

The study area is Port Harcourt, the capital city of Rivers State, Nigeria. The administrative structure of the study area is made up of two Local Government Authorities (LGAs); the Port Harcourt City Local Government and the Obio/Akpor Local Government Council. It is regarded as the Centre of Nigeria's oil and gas industry. Port Harcourt is situated East of the Niger Delta region at the southernmost part of Nigeria and it is bound between longitude 6007'E to latitude 4044'N of the Equator. It has a plain topography and is about 5m above sea level (Oyegun and Adeyemo, 1999). This plain is well drained and provides several connections with the sea (Gulf of Guinea) by a large number of creeks and channels. Five streams drain the Port Harcourt metropolis, connecting to the several Creeks that connect to the sea (Umunnakwe, et al., 2019). Port Harcourt climate falls within the sub-equatorial climate belt.

The establishment and growth of education in Port Harcourt followed the pattern where Christian missionaries of the colonial period were the main provider of educational services. The secondary schools were set up as part of the missionary thrust of the various churches purely for the spread of the Gospel. Abie, (2007) pointed out that government involvement in educational issues in Nigeria after the country's independence in 1960 have been steady but progressive as far as expansion in the number of educational institutions is concerned. There are fifteen (15) and twenty (20) Government Senior Secondary Schools in Port Harcourt and Obio/Akpor Local Government Areas respectively (Rivers State Senior Secondary School Board, 2018). The researcher decided to work in Port Harcourt metropolis because she is very conversant with the secondary schools in the area. The map of River State showing the study area is shown in fig .1"

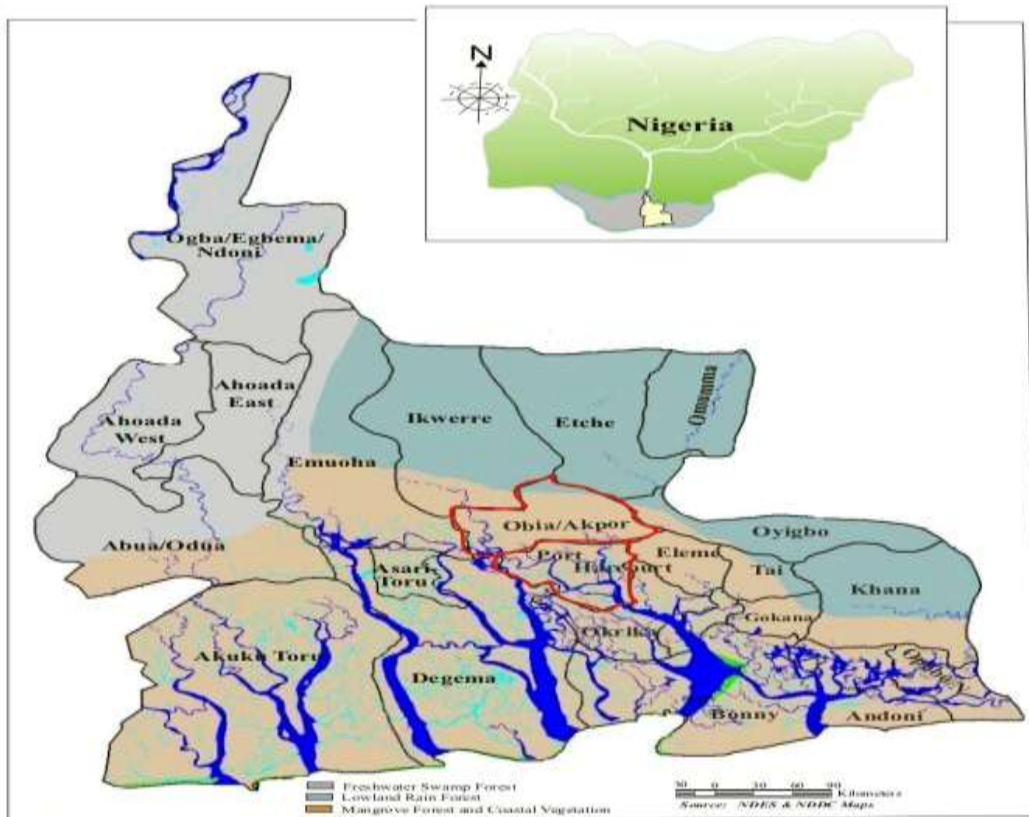


Figure 1. Map of Rivers State showing Study Area

Obio/Akpor

Lat.: 4° 38' 10" Long.: 7° 00' 07"

Port Harcourt.

Lat.: 4° 43' 07" Long.: 6° 56' 04"

III. Research Methods

The research design for this study is the quasi-experimental (Non-randomized, Pretest, Posttest and control group design). The researcher randomly assigned intact classes to groups. This is in order not to interrupt the normal classes of the students and the school time-table. The research made use of intact classes in four different Government Senior Secondary schools. The experimental group was taught the concept of Genetic using Video Instructional Strategy while the control group was taught using Instructional Diagrams.

The population of the study therefore comprises of all SS 3 Biology students in the two Local government areas with the total number of 7,963 students. From the schools which constituted the population of the study, two schools were randomly selected from each local government. Two schools were taken to be the experimental group, one school from Port Harcourt local government and the other from Obio/Akpor, while the other two schools were used as the control group in the same order. From each of the four schools, one intact class of SS 3 students was selected where Biology subject is offered by all the students in the class. Two hundred and forty students (240) from the four selected schools (60 from each school) formed the sample size for the study.

“The instrument for data collection was Biology Performance Test on Genetics (BPTG) made up of standard objective questions on Genetics. It was made up of 25 multiple choice items and each has four options (A – D) with only one correct option.

The research instruments were validated by experts and two SS 3 Biology teachers, after which The reliability trial test (pilot study) was carried out in one of the secondary school in the study area outside the sampled schools. The calculated reliability coefficient value of 0.76 was obtained. So it was accepted that the research instrument was reliable. Biology Performance Test on Genetics (BPTG) was administered to both the experimental and the control groups before the commencement of the teaching on Genetics. This is to determine the pretest scores of both groups.” The four weeks teaching on Genetics were carried out, after which Biology Performance Test on Genetics (BPTG) was reshuffled in their arrangement and given to the students in both groups to determine their post-test scores. Data generated from the study were analyzed at 0.05 level of significance using mean and standard deviation to answer research questions and Analysis of Covariance (ANCOVA) was used to test the hypotheses.

IV. Discussion

4.1 Results

a. Research Question one: What is the Difference in Academic Performance of Students Taught Biology Using VIS and those taught with ID?

Table 1. Difference in Mean and Standard Deviation Scores of Students Academic Performance in Biology for both VIS and ID

Group	N	Pretest		Posttest		Mean Gain
		\bar{x}	<i>SD</i>	\bar{x}	<i>SD</i>	
VIS	120	20.43	8.87	63.56	15.43	43.13
ID	120	20.42	8.30	53.73	14.34	33.31
Mean Difference		0.01		9.83		9.82

The pretest Mean Difference score between VIS and ID group were 0.01. A closer look at the pretest scores for both groups shows a similar value which is an indication that the groups were equivalent before treatment. The mean gains were 43.13 for VIS and 33.31 for ID with mean difference score of 9.82. This shows that students taught Genetics using VIS performed better than their counterparts taught with Instructional Diagram (ID). To determine whether there is significant difference in the mean performance scores between the two groups, hypothesis one was tested.

H_{01} : There is no significant difference in the academic performance of students taught Biology using VIS and those taught with ID.

To test this hypothesis, students’ pre-test and post-test scores were subjected to analysis of covariance (ANCOVA) using their pre-test as covariate for both VIS and ID groups. The results are as presented in Table 2.

Table 2. Summary of ANCOVA Analysis on the Difference in Academic Performance between VIS and ID groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	15420.083 ^a	2	7710.041	42.321	.000
Intercept	67787.987	1	67787.987	372.092	.000
Pretest	9628.245	1	9628.245	52.850	.000
Group	5777.287	1	5777.287	31.712*	.000
Error	43176.813	237	182.181		
Total	884037.000	240			
Corrected Total	58596.896	239			

a. R Squared = .263 (Adjusted R Squared = .257)

*Significant, $p (.000) < 0.05$ level of significance.

Analysis of Covariance (ANCOVA) statistics presented in Table 2 showed that significant difference exists in the mean scores of SS 3 students taught Biology with VIS and their counterparts taught with ID. Since the calculated $F_{(1,237)} = 31.712$, $P < 0.05$ level of significance. Therefore the null hypothesis was rejected. The result is that, there is significant difference in mean academic performance of SS 3 students taught Biology with VIS and those taught with ID.

b. Research Question two: What is the Difference in Academic Performance of Students Taught Biology Using VIS and those Taught with ID Based on Location?

Table 3. Pretest and Post-test Mean Difference Scores of Students taught Biology using VIS and ID based on Location

Location	Group	Pretest			Posttest		MD
		N	\bar{x}	<i>Sd</i>	\bar{x}	<i>Sd</i>	
<u>Obio-Akpor</u>	VCBI	60	22.53	7.18	61.88	15.13	39.35
	ICD	60	22.53	7.06	56.50	9.74	33.97
Mean Difference (MD)			0.00		5.38		
<u>Port Harcourt</u>	VCBI	60	18.33	9.90	65.23	15.68	46.90
	ICD	60	18.30	8.94	50.97	17.45	32.67
Mean Difference (MD)			0.03		14.26		

The posttest mean difference scores for Obio-Akpor Biology Students were 5.38 while that of Port Harcourt were 14.26. This generally showed that students in Port Harcourt performed better than their counterpart in Obio-Akpor. The table revealed the Mean Difference scores for students in Obio-Akpor in the experimental group to be 39.35 while for

students in Port Harcourt in the same group were 46.90. This shows that students in Port Harcourt had higher mean performance score than their counterparts in Obio-Akpor in the use of VIS. The Mean Difference scores for students in Obio-Akpor in the control group were 33.97 while for students in Port Harcourt in the same control group were 32.67. This showed that students in Obio-Akpor had slight higher mean score than their counterparts in Port Harcourt in the use of ID. To determine whether the mean performance scores between the two groups were significantly difference, hypothesis two was tested.

Hypotheses 2 (H_{02}): There is no significant difference in the academic performance of students taught Biology using VIS and those taught with ID based on location.

To test this hypothesis, students' pre-test and post-test scores were subjected to analysis of covariance (ANCOVA) using their pre-test as covariate for both VIS and ID groups. The results are as presented in 4.

Table 4. Summary of ANCOVA Analysis on the Difference in Academic Performance between VIS and ID Groups Based on Location

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	16860.589 ^a	4	4215.147	23.734	.000
Intercept	62399.108	1	62399.108	351.344	.000
Pretest	9813.543	1	9813.543	55.256	.000
Group	5776.680	1	5776.680	32.526	.000
Location	263.371	1	263.371	1.483	.225
Group * Location	1176.859	1	1176.859	6.626*	.011
Error	41736.307	235	177.601		
Total	884037.000	240			
Corrected Total	58596.896	239			

a. R Squared = .288 (Adjusted R Squared = .276)

For location, NS = Not significant, $p (.225) > 0.05$ level of significance.

For Interaction between Group and Location, *Significant, $p (.011) < 0.05$ level of significance.

From Table 4, Analysis of Covariance (ANCOVA) statistics showed that there is no significant difference in the mean scores of SS 3 Biology students taught Genetics using Video Instructional Strategy and those taught with Instructional Diagram based on location. Reasons being that the calculated $F_{(1,235)} = .225$, $P > 0.05$ level of significance. This means that no significant differences exist between location and academic performance, therefore, the null hypothesis which states that there is no significant difference in academic performance of SS 3 students taught Biology using Video Instructional strategy and those taught with Instructional Diagram based on location is hereby accepted and retained.

However, when the treatment variables such as VIS and ID were combined with location, it showed a significant difference. There is significant difference between interaction variables and location as calculated $F_{(1,235)} = .001$, $P > 0.05$ level of significance. This means that treatment and location when put together as interaction have effect on the students' performance. Significant difference existed between location and Instructional method.

4.2 Discussion

The research indicated significant difference in the performance of Biology students taught concept of Genetics using Video Instructional Strategy and those taught using Instructional Chart and Diagram. This significant difference is attributed to the fact that the use of video encouraged the students to learn at their own pace especially the slow learners. VIS as a self-learning technique helped the students to use the audio visual property of the video to gain deeper understanding of the concept which were considered to be abstract and difficult. The students in the experimental group were able to comprehend the concept of Genetics better than the students in the control group because they could see it being played out in front of them. This implies that Video Instructional Strategy improves students' academic performance more than the use of Instructional Diagram.

The statistical analysis of the study showed that location has no significant effect on academic performance of Senior Secondary three (SS3) Biology students taught the concept of Genetics using Video Instructional Strategy and Instructional Diagram. This shows that despite the school location, students can perform well if only they are taught very well using effective teaching strategy. This implies that both urban and rural students thrive for better academic success.

V. Conclusion

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

- Biology teachers should adopt the use of Video Instructional Strategy approach in teaching of Biology especially those topics that are considered to be abstract.
- Ministry of Education and Administrators of Science Education should always organize seminar, conferences and workshops to sensitize Science teachers on the use of the Video in teaching.
- Further studies can be carried out to ascertain the availability of these technology based instructional tools in the schools and their uses in learning.

References

- Abdullahi, Y., Nasiru, I. T. & Shamsudeen, B. (2019). Secondary School Students and the internet in Sokoto metropolis. Science Teachers Association of Nigeria: Innovation in Stem Education. Annual conference proceedings of Science Teachers Association of Nigeria. 221 – 228.
- Abie, S. (2007). Comparative Education: A Global Perspective. Port Harcourt: Nissi Books.
- Abubakar A. A. (2015). Effect of Instructional Video on Academic Performance of Social Studies Students in Secondary Schools in Katsina State, Nigeria M.Sc. Thesis Submitted to the School of Postgraduate Studies Ahmadu Bello University, Zaria.
- Admin, A. (2018). Influence of School Facilities on Student Achievement in Biology in Secondary Schools Retrieved 6/11/2019 from <https://tycomputer.com.ng/author/admin>.
- Admin, E. (2019). Benefits of Using Educational Videos in the Classroom Retrieved

- 6/6/2020 from <https://www.elesapiens.com/blog/the-benefits-of-using-educational-videos-in-the-classroom/>
- Afolabi, M. J. (2019). Effects of Computer-Assisted Instruction, Ability and Gender on Senior Secondary School students' Academic, self-concept in Chemistry Proceedings of the 60th Anniversary Conference of the Science Teachers Association of Nigeria.
- Arunima, M. (2017). Getting Started with Video-Based Learning. Retrieved 6/6/2020 from <https://elearningindustry.com/video-based-learning-getting-started>
- Cruse, E. (2007). Using Educational Video in the Classroom: Theory, Research and Practice. M.Ed Thesis Curriculum Director, Library Video Company, Kaiser Family Foundation.
- Ibekwe, R (2017). Education and National Development in Nigeria: The Underlying Assumption and Practical Realities. *Journal of Education and Society JES IAUE*, 7(1), 30 -39.
- Miranda, K (2001). Effective Teaching Methods: eHow Contributor. Retrieved 10/10/2019 from <http://www.ehow.com/search.html>.
- Onasanya, S. A., Shehu, R. A., Ogunlade, O. & Adefuye, T. (2010). Teachers awareness ant extent of utilization of information and communication technology for effective science and health education in Nigeria. Singapore. *Journal of Science Research*, 6(3), 15 – 18.
- Opara, J. A. (2011). Inquiry method and student academic achievement in biology lessons and policy implications. *American-Eurasian Journal of Scientific Research*, 6(1), 28 – 31.
- Oyegun, C.U. & Adeyemo, A. (1999). Port Harcourt Region. Lecture note from Department of Geography and Environmental Management, University of Port Harcourt.
- Pandey, A. (2018). Examples of Video-Based Learning for Corporate Training. Retrieved 6/6/2020 <https://elearningindustry.com/video-based-learning-for-corporate-training-8-examples>
- Rivers State Senior Secondary Schools Board (RSSSSB), (2018). Ministry of Education Planning, Research and Statistics Department Rivers State.
- Umar, S. (2012). Utilization of Instructional Materials and its Effects on Academic Performance of Gender among Secondary School Biology Students of Kura Education Zone, Kano State -Nigeria. Research Seminar Paper Ahmadu Bello University, Zaria.
- Umunnakwe, J. E; Ekweozor, I. & Umunnakwe, B. A. (2019). Impact of Lifestyle Scenarios on Household Waste in Port Harcourt. *Management of Environmental Quality: An International Journal* . Emerald Insight Publishers , 30 (4) ,. 864 – 889.
- University Matriculation Examination (2017). Brochure. Publication of Joint Admission and Matriculation Board (18th Ed.) Lagos, Nigeria.
- West African Examination Council (2016). General resume of the chief examiner's reports on the standard of the papers. Lagos: WAEC Nigeria.