Influence of Multimedia Resources on Academic Performance of Biology Students in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State.

BRUNO, IBEABUCHI ANWURI[1], OREKE, HAPPINESS OBUSOR[2], AJIE, ULOMA GLORY[3]
OGUNBAYO, OLUWATOYIN GLORY[4], DONATUS, CHARLES[5], BEN- FRED JOSY C.[6]
[1,2,3,4,5,6] *Biology Department, Federal College of Education (Technical) Omoku*

Abstract- ***The study focused on the influence of multimedia resources on academic performance of biology students in Senior Secondary schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State. The study was guided by three research questions. A descriptive research design was adopted. 5,620 from four randomly sampled private schools make up the population of the study with a sampled size of 562 students. Data was collected using a self-structured questionnaire titled: Influence of Multimedia Resources on Student's Performance in Biology (IMRSPB) and a checklist to assess the resources availability. The instrument was validated by experts in Science Education. Reliability coefficient of 0.75 was determined using cronbach alpha to test the internal consistency. The findings revealed that multimedia resources positively influenced students understanding particularly in enhancing their performance in Biology. The study also revealed insufficient availability and low utilization of multimedia resources in senior Secondary schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State to maximize teaching and learning benefits. It was therefore recommended based on the findings that science teachers generally, and Biology teachers in particular should utilize multimedia resources to enhance effective teaching and learning which will subsequently increase students performance. School administration should endeavour to provide multimedia resources for science and Biology Teachers.***

Indexed Terms- ***Influence, Multimedia Resources, Performance, Biology.***

I. INTRODUCTION

The purpose of education is to develop knowledge, skills and character of students. Thus, Education is the process of learning and knowing, which is not restricted to schools or textbooks. Education is very important for an individual's life. According to Salihu (2015), education is a major aspect of development of any modem society. The quality of the education depends on the availability of resources in the school, and the performance of students depends greatly on the teachers' knowledge, skills and attitude in using these resources. Schools that have qualified teachers, interactive teaching and learning materials, comfortable school compounds can provide qualitative and quantitative education for its learners (Salihu, Abdullahi, Alfa & Muhammed, 2015). The purpose of learning and teaching resources is to provide a source of learning experiences for students. Learning and teaching resources should be able to facilitate interaction among students and teachers during the learning) teaching process, as well as to help students to learn, broaden students' learning experiences and meet different learning needs.

There are techniques that encourage the development of creativity, ability or provide experience not easily secured in any other way. These techniques are embedded in the use of Information and Communication Technology (ICT). Application of Information and Communication Technology (ICT) in teaching and learning has been widespread and popular among students and teachers. It promotes learning and teaching skills. One of the interesting

aspects of ICT application is Multimedia resources. By multimedia resources, educators usually refer to the use of Information Communication Technology (ICT) equipments which offer an effective dialogue between the resource materials indirectly with the instructor and the students in comparison with traditional methods of teaching which may lack such interactivity (Nusir, Alsmadi, Al-kabi, & Shardqah, 2011). Moreover, multimedia has the potential to create high quality learning environment especially for students, with the capability of creating a more pragmatic learning context through its different media like - text, graphics, videos, animation among others. Multimedia resources have paramount importance in teaching (Altherr, Wagner, Eckert, & JodI, 2014). With the help of multimedia, one can present different phenomena and processes vividly, simulate complex content, and present different levels of abstraction. This helps in meaningful and authentic learning. Multimedia resources are useful especially when students have low motivation and low prior knowledge (Singh, 2013).

This is an era of science and technology which are the backbone for the prosperity of a nation. Nigeria's education policies emphasized functional education for learners at all levels to trigger students' curiosity in scientific inquiry and understanding of scientific concepts and processes. The current teaching strategies have failed to enhance problem solving skills, curiosity, critical and logical thinking among students. There is need to move from traditional approaches of teaching and learning to more innovative method which involves, information and communication technologies (ICTs) for meaningful learning. The technologically advanced world has posed challenges for both teachers and students. The use of ICT in the teaching and learning process has become an important feature. Multimedia-aided teaching (MAT) is a means of instructional delivery usually used with the traditional method of teaching (Rolfe & Gray, 2011). It is a presentation consisting of words, sound, and pictures that is designed for meaningful learning.

One of the teaching technologies included in the teaching-learning process is a series of multimedia applications developed due to advances in information technologies and cognitive theories. Considering the technology available today, the rapid growth of the internet highlights the importance of web-based learning environments and paves the way for educators to more greatly benefit from multimedia applications. Yui, Liu and Wai (2012) emphasized some of the most significant features of web-based learning environments, including less need for a multitude of devices; accessibility by anyone, anywhere, and anytime; independence of time and space limitations; and worldwide support for communication and cooperation.

Adedapo, Salawu and Afolabi (2011) conducted a study titled Impact of Video and Audio Taped Instruction on Cognitive Learning Outcomes in Economics. This study assessed the effectiveness of video and audiotaped instructional strategies on cognitive learning outcomes in Economics. The sample used for this quasi-experimental study consisted of 364 Senior Secondary Two (SSII) students drawn from secondary schools in Oyo Metropolis. Two hypotheses were postulated and tested using Analysis of Covariance (ANCOVA), Turkey/Kramer post hoc test and mean. The results of the study showed that there was a significant difference in the student's cognitive achievement and interest in Economics which were mostly enhanced by the video-taped strategy, followed by audiotaped strategy and minimally by the conventional strategy. Recommendations were made that the video instructional strategy should be given more emphasis during teaching and learning of Economies and be integrated into other related subjects in secondary schools. This study and that of Adedapo, Salawu and Afolabi (2011) used secondary school students.

Hwang et al. (2017) examined the effect of concept mapping and web-based problem-solving instruction on students' learning achievements and perceptions of biological evolution. The results indicated that multimedia-based instructional approaches significantly improved students' understanding of complex biological concepts and fostered positive attitudes towards learning. Similarly, Pekdag & Ertekin (2015) investigated the effect of multimedia presentations on the visual intelligence development of children. The exposure to multimedia resources, such as interactive animations and virtual

simulations, contributed to the enhancement of students cognitive abilities.

The integration of multimedia resources into the teaching and learning of biology offers numerous advantages that enhance the educational experience for both students and teachers. Below are some of the key advantages:

1. Enhances engagement and motivation: Multimedia resources capture students' attention, making them more interested and motivated to learn.
2. Simplifies complex concepts: Multimedia resources help break down difficult ideas into easy-to-understand visual and interactive elements.
3. Increases understanding and retention: By using multiple senses, multimedia resources aid students in grasping and remembering information better.
4. Supports diverse learning styles: Multimedia resources cater to different learning styles, such as visual, auditory, and kinesthetic.
5. Encourages interactive learning: Multimedia resources promote hands-on learning, allowing students to explore and experiment.
6. Provides accessibility and flexibility: Multimedia resources can be easily accessed and used in various settings, at any time.
7. Makes learning fun and enjoyable: Multimedia resources add an entertaining element to learning, making it a positive experience.

However, it is obvious that many science teachers today in secondary schools are caught in the midst of a change for which they may not have been professionally prepared. Many teachers were educated in the classrooms where the role of the student was to memorize information, conduct well-regulated experiments etc. and were then tested on their ability to repeat these tasks or remember specific facts. It was on this note, that this study was carried out to examine the influence of Multimedia Resources in Teaching and Learning Biology in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State, and as a contribution towards the development of knowledge and literary presentation in the study area and beyond.

Statement of the Problem

Multimedia resources play a vital role in effort to move biology from rote memorization of information towards a more student-centered and hands-on learning experience. Despite the movement within the discipline to promote students use of computer to facilitate reflective inquiry, and problem solving, biology education continue to focus on traditional, text-books based approaches in the study area. Osborne, Simon, & Collins, (2003) suggest that some students find biology teaching and learning boring and unimportant, like the engineering students and other disciplines that they have difficulty understanding Biology textbooks, and they remember very little of what they learnt.

Despite the potential benefits of multimedia resoces in biology education, their utilization in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State remains understudied and unutilized. The researcher therefore intends to find out if the use of multimedia resources will have a positive influence on the academic performance of biology students in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State.

Purpose of the Study

The purpose of this study is to examine the influence of multimedia resources on the performance of biology students in senior secondary schools in Obio/Akpor Local Government Area, Rivers State. The study specifically:

i. Examine the influence of multimedia resource on students' performance in biology in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State.
ii. find out the type of Multimedia Resources available in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area.
iii. find out the extent to which Multimedia Resources were utilized in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area.

Research Questions

The following research questions were formulated to guide the study

i. To what extent do multimedia resources influence students' performance in biology in senior secondary schools in Ogba/Egbema/Ndoni Local Government Area, Rivers State?
ii. What are the types of Multimedia Resources available in senior secondary schools in Ogba/Egbema/Ndoni Local Government Area?
iii. What is the extent to which Multimedia Resources were utilized in senior secondary schools in Ogba/Egbema/Ndoni Local Government Area?

III. METHODOLOGY

The study employed a descriptive survey design. The population of the study includes all senior secondary students studying Biology in Ogba/Egbema/Ndoni Local Government Area of Rivers State. Specially 5,620 students from four randomly sampled private senior secondary schools make up the population while 562 was used as the sample size for the study. The study utilized a self-structured questionnaire titled Influence of Multimedia Resources on Students' Performance in Biology (IMRSPB). The questionnaire consist of questions based on the variables identified in the study, divided into 3 sections A, B, and C, to capture information for data collections. The questionnaire also employed the use of 4 point likert scale. The response modes were: Extent = 4, High extent = 3, Low extent = 2 and Very low extent = 1.

A checklist was however used to examine the available multimedia resources. The instrument was validated by two experts in the department of Science Education, Biology option Faculty of Education, Rivers State University, Port Harcourt. The reliability test of the instrument was carried out using cronbach alpha and reliability coefficient of 0.75 was obtained. The instrument was administered in four (4) senior secondary private schools within one week with the assistance of the school administrators and the Biology teachers in each school visited.

The respondents were instructed on how to fill the instrument and all responded questionnaires were retrieved immediately. Data collected were analysed using mean, percentages and standard deviations to answer the research questions.

IV. RESULTS

Table 1: Mean Response and Standard Deviation to Show the Extent Multimedia Resources Influence on Students Performance in Biology.

Statement	Mean	Standard Deviation	Remark
1. The use of multimedia resources in biology lessons makes the subject more interesting and engaging.	4.1	0.8	High extent
2. Multimedia resources help me understand difficult biology concepts better.	3.9	0.9	High extent
3. I performed better in biology exams when multimedia resources are used during lessons.	3.8	0.9	High extent
4. The use of multimedia resources improves my retention of biology information.	4.0	0.8	High extent
5. I feel, more confident in my biology knowledge when multimedia resources are used.	3.7	1.0	High extent
6. Multimedia resources provide a better learning experience compared to traditional teaching methods.	4.2	0.7	High extent
7. I am more motivated to study biology when multimedia resources are used in class.	3.9	0.9	High extent
8. Multimedia resources make biology lessons more practical and real-life applicable.	4.1	0.8	High extent
9. The use of multimedia resources helps me score higher in biology assignments and tests.	3.7	1.0	High extent
10. I prefer biology classes where multimedia resources are frequently used.	4.3	0.7	High extent

The mean scores of most statements in table I above are more than 3.5 indicating a positive understanding of multimedia resources when used in Biology Education. For instance, statement 6 ("multimedia resources provide a better learning experience compared to traditional teachings") and in statement 10 ("I prefer Biology classes where multimedia resources are frequently used") have the highest mean scores indicating strong student preference for multimedia enhanced learning environment.

Table 2: Percentage Responses on the Type of Multimedia Resources Available in Senior Secondary Schools in Ogba/Egbema/Ndoni local Government

S/N	ITEMS	AVAILABLE %	NOT AVAILABLE %	REMARK
1.	Computers	90.91	9.09	AVAILABLE
2.	Interactive Whiteboards	63.64	36.36	AVAILABLE
3.	Educational CDs/DVDs	9.09	90.91	NOT AVAILABLE
4.	Educational Software (e.g simulations, virtual labs)	27.27	72.73	NOT AVAILABLE
5.	Internet access for research and learning.	27.27	72.73	NOT AVAILABLE
6.	Digital microscopes	18.18	81.82	NOT AVAILABLE
7.	Audio-visual materials (e.g biology-related videos	36.36	63.64	NOT AVAILABLE
8.	Multimedia Reference Books (e-books)	27.27	72.73	NOT AVAILABLE
9.	Overhead projectors	36.36	54.55	NOT AVAILABLE
10.	Online collaborative platforms	18.18	81.82	NOT AVAILABLE
11.	Microsoft Office Suite (Word, Excel, PowerPoint)	63.64	36.36	AVAILABLE

SOURCE: Field Survey (2023)

Table 2 reveled that Educational CDs/DVDs, Educational Software (eg., simulation, visual labs), internet access, Digital microscope etc, with respect to percentage availability was below 40% and so regarded as Not Available, while Computer, interactive white board and micro soft suite with respect to percentage was above 50% and so available.

Table 3: Mean Responses on the Extent to which Multimedia Resources were Utilized in Senior Secondary Schools in Ogba/Egbema/Ndoni Local Government Area.

S/N	ICT RESOURCES	$\bar{X}$	SD	REMARK
1.	Computers	1.54	1.00	Very Low Extent
2.	Interactive Whiteboards	1.87	1.27	Low Extent
3.	Educational CDs/DVDs	1.21	0.41	Very Low Extent
4.	Educational Software (e.g simulations, virtual labs)	1.37	0.60	Very Low Extent
5.	Internet access for research and learning.	1.89	0.96	Low Extent
6.	Digital microscopes	1.21	0.57	Very Low Extent
7.	Audio-visual materials (e.g biology-related videos	1.39	0.71	Very Low Extent
8.	Multimedia Reference Books (e-books)	1.24	0.60	Very Low Extent
9.	Overhead projectors	1.99	0.69	Low Extent
10.	Online collaborative platforms	1.18	0.53	Very Low Extent
11.	Microsoft Office Suite (Word, Excel, PowerPoint)	1.27	0.72	Very Low Extent

The findings from the table above revealed that all multimedia resources listed were not fully utilized in the teaching and learning of Biology with a mean less than 2.5.

V. DISCUSSION OF FINDINGS

The findings from the analysis of multimedia resource utilization in biology education highlight several key points. First, there was a strong student preference for multimedia enhanced learning environments, as reflected in the high mean scores for statements related to the engagement and effectiveness of multimedia tools. This is consistent with the broader literature, which has consistently shown that multimedia resources can improve student engagement, and academic performance in various subjects, including biology (Mayer, 2019; Neo & Neo, 2019).

However, the study also revealed a significant gap between the availability of multimedia resources and their actual utilization in classrooms. Despite the presence of some essential tools like computers and interactive whiteboards in over 50% of schools, other critical resources like educational software, digital microscopes, and online collaborative platforms are largely unavailable, and those that are available are underutilized.

The findings are in Line with several other studies that have explored the impact of multimedia resources on educational outcomes. For example, a study by Neo and Neo (2019) found that multimedia tools significantly enhanced students engagement and understanding of complex concepts. Similarly, Mayer (2019) emphasized that multimedia resources, when designed and implemented effectively, can facilitate effective learning by providing multiple representations of content and catering to different learning styles.

However, the findings also revealed underutilization of multimedia resources, which mirrors the conclusions of Agbo (2015), who pointed out that the mere presence of technology in classrooms does not automatically translate into improved educational outcomes. This underscores the necessity of teacher training and curriculum integration, as highlighted by

Oye, Tahad, & Ab. Rahim (2012), who argued that the effectiveness of multimedia resources depends heavily on how they are used in the educational process.

CONCLUSION

The study highlights the significance of multimedia resources in enhancing students' learning experiences and academic performance in biology. Students understanding of multimedia tools underscore the need for schools to embrace and integrate these technologies more fully into their teaching strategies. However, the findings revealed a gap between the availability of multimedia resources and their actual use in the classroom, suggesting that the Presence of technology alone is not sufficient; effective utilization and integration are crucial.

Furthermore, the slight difference in confidence levels among students despite their positive experiences with multimedia resources indicates that consistent and strategic use of these tools are necessary to reinforce learning and build students confidence. These conclusions are supported by related research, which emphasizes the importance of teacher training and curriculum integration to maximize the benefits of multimedia in education.

In essence, while multimedia resources hold great promise for improving biology education, their impact is contingent upon effective implementation, requiring both the availability of resources and the capacity of educators to utilize them to their full potential. This study emphasizes on the need for strategic support to help teachers in the integration of multimedia tools into educational practices to enhance students outcomes in biology and other subjects.

RECOMMENDATIONS

Based on the findings,the following recommendations were made:

1. Schools should create a detailed plan for integrating multimedia resources into the biology curriculum. This plan should outline how multimedia will be used to support learning objectives, enhance engagement, and provide opportunities for interactive learning.
2. Implement professional development programs focused on multimedia tools and techniques. Training should cover both the technical aspects of using multimedia and pedagogical strategies for effective integration. Ongoing workshops, seminars, and online courses can help teachers stay updated with the latest tools and best practices.
3. Provide dedicated technical support to assist teachers with the setup and use of multimedia resources. This could include on-site support, help desks, and online resources to troubleshoot issues and ensure smooth operation.
4. Develop multimedia resources that are interactive and engaging to maintain student interest. This can include interactive simulations, educational games, and multimedia projects that encourage active participation.
5. Encourage a positive attitude towards multimedia tools among students and teachers. Highlight the benefits and successes of multimedia integration to build enthusiasm and acceptance.

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