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Impact of Learning Resources Improvisation on Biology Instruction in Senior Secondary Schools in Ondo South Senatorial District in Nigeria

Wpływ improwizacji zasobów kształcenia na kształce- nie biologii w szkołach średnich starszych w południowym okręgu senatorskim Ondo w Nigerii

Introduction

In Nigerian secondary schools, biology is one of the basic sciences among the core subjects taught in the senior secondary schools (SSS). Biology is the science of life. Traditionally, biology was divided into 'botany' the study of plants and 'zoology' the study of animals (Osei, 2019). Biology has several divisions such as morphology, anatomy, physiology, ecology, genetics and evolution. Modern biology differentiates pure biological science from the applied biology sciences which are nursing, medicine, pharmacy, and agriculture among others. The

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scope and nature of biology are those which are paramount to life. The role of biology has virtually spread through most aspects of human economic and public life (Rotimi, 2013). In general, some branches of biology have contributed to the provision of health and disease control, development of industries, crime detection, provision of food and shelter, awareness of diversity of life, provision of foundation for future profession and understanding the physical world (Abanikanda, 2016).

According to Bell (2015), one of the purposes of teaching and learning biology is to equip the learner with knowledge and skills to live effectively in this modern age of Science and Technology and to enable the learner to contribute to the social and economic development of the nation. According to Winqt (2011), the ultimate goal of any teaching activity is to facilitate effective learning among students. In an attempt to ensure that effective learning takes place, teachers' effort should be geared towards ideas, methods and skills. School environment has been described as an organization where resources are produced, improvised, managed and organized in such a way that enables the students to acquire desirable learning competencies. The teaching of biology cannot be done effectively without interaction between the teacher, students and environmental resources. The biology curriculum is planned to enable the teacher to use activity oriented, child-centred approach (guided inquiry) to teach (Euba, 2017).

Improvisation is the act of construction of instructional materials from locally available materials that can adequately replace or function in place of the original material which otherwise may be very expensive, in short supply or unavailable (Winqt, 2011). Improvisation, therefore, is not just a pre-conceived, on the spot activity; improvisation is a state of mind and it is a skill that lies at the heart of good science teaching. Eniayeju (2013) opined that improvisation is the art of using alternative materials and resources to facilitate instruction whenever there is a lack or shortage of some specific first-hand teaching aids. Akinmoyewa (2012) viewed it as the art of designing a replica of something to make it function or play the role of the real thing, using available materials.

According to Kolawole (2016), the teaching of science process apart from its physiological benefits as a motivational factor is known to take a more lasting effect on students learning. Some process skills, on the other hand, appear to have a longer life span and are positively related to acquisition of appropriate scientific attitudes and habits because even those dropouts from school at

some stages are those that might not later specialize in scientifically intelligent question and pursue the solutions to their problems in like manners. The importance of these cannot be over emphasized; given that the world is daily becoming more scientifically and technologically sophisticated. To realize this basic goal how the curricula, emphasizing the teaching of science, were innovated inquires to inculcate scientific process skills.

Nwosis and Nzewi (2017) observed that these approaches emphasize active learning by learners in a social environment from which resources and references should be respectively drawn and made to make learning more effective, meaningful and relevant. For accuracy and precision, most science teachers tend to feel that these processes can only be used for expensive imported apparatuses. However, in the wake of increasing enrolment, dwindling economy and stringent financial support for science, there is a general call on teacher to use available local resources for improvisation to reduce cost and conserve hard foreign exchange.

Instruction on WASC/SSCE revealed that practical examination carries the highest mark of the total mark allocated to biology examination. It is therefore highly significant for every school to make sure that instructional resources for biology practicals are adequately provided and are functional. In stating what an ideal biology laboratory contains, Voss and Brown (2010) observed that the laboratory is a place where students can learn more skills of biology than merely the use of microscope. A well-equipped high school biology laboratory has the following pieces of equipment: a model of the mammalian ear, model of the mammalian skeleton, aquarium electron microscope, phase contrast microscope, automatic autoclave incubators, forecasts, slide analytical microtome and closed environmental chamber for independent attack on a problem.

Many reasons have been advanced on the need for improvisation, for example, Alonge (2013) outlined the reasons as: improvisation is a way of minimizing cost of equipment/materials; inexpensive method of widening the scope of inquiry; enables the teachers to make teaching/learning processes easier for students and provides a cognitive bridge to lead students from abstractions and its attendants or mental indigestion to a nodding acquaintance with reality. Balogun (2013) also emphasized that no effective science education programme can exist without equipment, it is indispensable to effective teaching and learning. We also need to bear in mind that at least some of the pupils

may intend to become professional scientists, technologists and engineers, and such pupils need the equipment to begin to develop the necessary science process skills. It has been observed that science education is a veritable tool for scientific and technological advancement of any nation, this fact is enshrined in the national policy of education (FRN, 2014) which states that science education should be among the subjects taught to students to equip them to live effectively in the modern age of science and technology. To achieve this, resources for teaching and learning science and technology (Biology inclusively) must be adequately produced and utilized judiciously in our secondary schools. It is on this basis that this work tends to investigate the impact of improvisation of learning resources on biology instruction in senior secondary schools in Ondo South Senatorial District.

Statement of the Problem

A lot of studies have been carried out to improve effective teaching-learning process by different researchers. The optimum value of biology has been greatly reduced due to the array of problems that its teaching and learning face over the years. Chukwunyeremunwa (2013) is of the opinion that lack of qualified teachers and incompetency arising from the poor/lack of training of science teachers in the improvisation of learning resources for biology instruction are among the factors responsible for poor performance of students in biology, especially at the secondary school level.

Singh and Singh (2012) reported lack of adequate professional training as a major problem, militating against the effective use of local and improvised resources for science teaching. Both Oyediran (2010) and Isola (2010) stressed the need for a definite well planned training programme of improvisation for teachers. The use of real-life situation as teaching materials facilitates easy communication which leads to better retention of what is learned when it is used what has not experienced or seen before. According to Abolade (2014), some of the factories, producing/importing instructional materials, have also been discovered to be based on foreign ideas and culture.

The problem of this study, therefore, is the non-usage of learning resources in teaching biology influenced by the lack of creative improvisation of teaching materials on the part of the teachers. This situation may be the one of the factors that causes poor performance of students in biology in both internal

and external examination. Thus, this research is designed to investigate the impact of improvisation of learning resources on biology instruction in senior secondary schools in Ondo South Senatorial District.

Purpose of the Study

The specific purposes of the study were:

- to investigate the availability of learning resources for biology instruction in senior secondary schools in Ondo South Senatorial District;
- to examine the impact of improvisation of learning resources on biology instruction in senior secondary schools in Ondo South Senatorial District;
- to determine the impact of improvisation of learning resources based on gender.

Research Questions

Are there available learning resources for biology instruction in senior secondary schools in Ondo South Senatorial District?

What is the impact of improvisation of learning resources on biology instruction in senior secondary schools in Ondo South Senatorial District?

Research Hypothesis

H1. There is no significant difference in the impact of improvisation of learning resources based on gender.

Scope of the Study

Investigation was limited to senior secondary school students in Ondo South Senatorial District to investigate the impact of improvisation of learning resources for biology instruction.

Research Type

The researcher used descriptive research of the survey type.

Study Material

The population for this study comprised all senior secondary school students in Ondo State Senatorial District.

Sample and Sampling Techniques

Simple random sampling technique was adopted in this study. Ten (10) senior secondary schools were randomly selected in Ondo South Senatorial District. From the ten schools, thirty-five (35) students were randomly selected in each of the selected schools. Therefore, in all, three hundred and fifty (350) respondents constituted the study sample.

Research Instrument

The instrument for this study consisted of an inventory and a checklist combined in one single instrument. The instrument was personally structured by the researcher and tagged “Improvised Learning Resources for Biology Instrument”. The same research instrument was given to students to elicit their opinion on the impact of improvisation of learning resources on biology instruction in senior secondary schools in Ondo South Senatorial District.

Validity of Instrument

Efforts were made during the construction of the instrument to ensure that it measures the desired objectives of the study. Therefore, the instrument was clearly designed and given to an expert in learning resources and an instructional technologist with a bias for science instruction for their criticism and approval. Experts in the field of measurement and evaluation were consulted for their input. All comments and corrections made were taken care of in order to ensure the validity of the instrument.

Reliability of Instrument

The test re-test method was employed in an attempt to determine the consistency of the instrument. The research instrument was administered to

30 respondents who did not partake in the main study. The administration was done within an interval of three weeks. Pearson Product Moment Correlation (PPMC) was used in computing the reliability coefficient of the instrument and a value of 0.82 was obtained, indicating that the instrument is reliable for use.

Procedure for Data Collection

The researcher administered the instrument to the respondents. This was done by visiting personally the selected schools and by distributing personally the research instrument to the respondents. The instrument was retrieved immediately after it has been correctly filled in by the students and their responses were gathered for analysis.

Data Analysis

The collected data were analysed using percentage, mean, standard deviation and t -test analysis.

Results

Demographic Information

Table 1. *Respondent Distribution by Gender (N = 350)*

	F	%
Male	162	46.3
Female	188	53.7
Total	350	100.0

Source: own study.

Table 1 presents the gender distribution of the respondents. It shows that 46.3% are male while 53.7% are female.

Analysis of Research Question

Research Question 1: Are there available learning resources for biology instruction in seniorsecondary schools in Ondo South Senatorial District?

Table 2. Analysis of the type of learning facility available for teaching science in seniorsecondary school in Ondo State (N = 350)

S/N	ITEMS	Available		Not Available	
		f	%	f	%
1.	Tissue Homogenizer	77	22.0	237	78.0
2.	Digital Rheometer	136	38.9	214	61.1
3.	Weighing balance	269	76.9	81	23.1
4.	Graphs, charts and maps	259	74.0	91	26.0
5.	Projector	112	32.0	238	68.0
6.	Audio tape	255	72.9	95	27.1
7.	Fluorimeter	164	46.9	186	53.1
8.	COD digester	126	36.0	224	64.0
9.	Spectrometer	103	29.4	247	70.6
10.	Textbooks	237	67.7	113	32.3

Source: own study.

Table 2: Analysis of the type of e-learning facilities available for teaching science in senior secondary schools in Ondo State. The e-learning facilities available for teaching science were: weighing balance (76.9%), graphs, charts and maps (74.0%), and audio tape (72.9%). The e-learning facility that were not available for teaching science were: tissue homogenizer (78.0%), digital rheometer (61.1%), projector (68.0%), fluorimeter (53.1%), COD digester (64.0%), spectrometer (70.6%).

Research Question 2: What is the impact of the improvisation of learning resources on biology instruction in the senior secondary schools from Ondo South Senatorial District?

Table 3. Analysis of the impact of improvisation of learning resources on biology instruction in the senior secondary schools from Ondo South Senatorial District (N = 350)

S/N	ITEMS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
		f %	f %	f %	f %	f %
1	Improvisation of learning resources makes students learn biology concept quickly	151 43.1%	134 38.3%	20 5.7%	28 8.0%	17 4.9%
2	It enables students to understand more abstract ideas of biology	106 30.3%	166 47.4%	32 9.1%	29 8.3%	17 4.9%
3	Learning resources broaden the students' practical skills in biology.	109 31.1%	142 40.6%	49 14.0%	33 9.4%	17 4.9%
4	It makes biology class interesting to students	93 26.6%	128 36.6%	46 13.1%	55 15.7%	28 8.0%
5	It increases students' knowledge in biology	135 38.6%	134 38.3%	11 3.1%	45 12.9%	25 7.1%
6	Improvisation of learning resources enables students to remember and retain what has been taught in biology	182 52.0%	109 31.1%	8 2.3%	26 7.4%	25 7.1%
7	It sustains students' attention in class during the lesson	137 39.1%	129 36.9%	30 8.6%	33 9.4%	21 6.0%
8	It stimulates students' learning	121 34.6%	90 25.7%	62 17.7%	63 18.0%	14 4.0%
9	It enables students to learn at their own pace	156 44.6%	115 32.9%	16 4.6%	31 8.9%	32 9.1%
10	It complements teachers' verbal explanation.	120 34.3%	138 39.4%	36 10.3%	34 9.7%	22 6.3%

Source: own study.

Table 3 presents the analysis of the impact of improvisation of learning resources on biology instruction in senior secondary schools from Ondo South Senatorial District. The items the respondents agreed with were: improvisation

of learning resources makes students learn biology concepts quickly (81.4%); it enable students to understand more abstract ideas of biology (77.7%); learning resources broaden students' practical skills in biology (71.7%); it makes biology class interesting to students (63.2%), it increases students' knowledge in biology (76.9%); improvisation of learning resources enables students to remember and retain what has been taught in biology (83.1%); it sustains student's attention in class during the lesson (76.0%); it stimulates students' learning (60.3%); it enables students to learn at their own pace (77.5%); and it complement teachers verbal explanation (73.7%).

Research Hypothesis

Hypothesis 1: There is no significant difference in the impact of improvisation of learning resources based on gender.

Table 4. Summary of *t*-test analysis to establish if there is an impact of improvisation of learning resources based on gender

	N	Mean	S. D	T	Df	Sig. (2-tailed)	Remark
Male	162	42.70	25.96	1.01	348	0.521	Not significant
Female	188	31.46	23.18				

Source: own study.

Table 4 shows the analysis of establishing a significant difference in the impact of improvisation of learning resources based on gender. The result revealed that there is no significant difference in the impact of improvisation of learning resources based on gender. ($t = 1.01$, $df = 348$, $p > 0.05$). This implies that the impact of improvisation of learning resources is the same for both males and females.

Discussion of Findings

Research Question One: The result of data analysis on the type of learning facilities available for teaching science in senior secondary schools revealed

that majority of the respondents agreed that weighing balance, graphs, charts and maps, and audio tape are available. Also, majority of the findings revealed that tissue homogenizer, digital rheometer, projector, fluorimeter, COD digester, and spectrometer are not available for teaching science in senior secondary school in Ondo South Senatorial District. This finding establishes the assertion of Balogun (2013) who emphasized that no effective science education programme, inclusively of biology, can exist without equipment. They are indispensable to effective teaching and learning. The finding is in agreement with Akindele (2012) who outlines several learning resources for teaching science such as the chalkboard, books and periodicals, wall sheets, charts, maps, atlases and globes, media such as specimens – both living and preserved artifacts, models and puzzles. Ayodele (2018) revealed that learning resources that are available for the teaching of science subjects are laboratory tools. The findings also support Emmanuel (2015) who revealed that learning resources are the important tools that aid the learning and teaching of science subjects, for example, graphs, charts, maps and projector. The findings are in disagreement with Ajayi and Clington (2011) who revealed that ICT tools for learning resources are not available in the majority of secondary schools in Nigeria. Onadipe (2013) also outlines the available learning resources in teaching science in secondary schools as non-electronic devices.

Research Question Two: The result of data analysis on the impact of improvisation of learning resources on biology instruction in senior secondary schools revealed that majority of the respondents agreed that improvisation of learning resources makes students learn biology concepts quickly, enables students to understand more abstract ideas of biology, broadens the practical skills of students in biology, makes biology class interesting to students, increasing their knowledge in biology, enables students to remember and retain what has been taught in biology, sustains students' attention in class during the lesson, stimulates students' learning. Majority of the respondents also agreed that improvisation of learning resources enables students to learn at their own pace and it complements teachers' verbal explanation. Unfortunately, many of these mentioned learning resources have not been practically improvised for students of Biology to see and enjoy. The finding is in agreement with Storm (2011), who opined that learning resource is a very important variable in teaching and learning biology. Facilities are the classroom, laboratories, workshop and equipment. Faisal and Annutte (2012) opined that the decline

in the students' performance is due to inadequate use of instructional materials. The finding is also supported by Alonge (2013) who revealed that learning resources have been identified as very important variables in teaching and learning science subjects through the world and have been having great impact on students' academic performance. Euba (2017) also revealed that teaching biology cannot be done effectively without interaction between the teacher, students and environmental resources. The finding is in disagreement with Olubadewo (2015) who revealed that the effects of improvised learning resources and students' academic performance have not been seriously researched in Nigeria. Patrick (2011) also observed that the effects of these facilities affect the students either negatively or positively depending on the conditions created by the learning environment.

Research Hypothesis: The tested hypothesis revealed that there is no significant difference in the impact of improvisation of learning resources based on gender. According to Thierer (2012), biology is a fascinating and important subject because it dramatically affects human daily lives and future. The findings also support Philip (2014) who revealed that there is no significant difference between male and female view on the impact of learning resources. The findings are in disagreement with Winqt (2011) who revealed that the influence of learning resources in teaching biology is significantly different in the perception of both male and female students. Patrick and Wilson (2011) also revealed that male teachers make use of more or less learning resources in their teaching than their female counterpart. Lyons (2012) revealed that learning is a complex activity that involves interplay of students' motivation, physical facilities, teaching resources, teaching skills and curriculum demands.

Conclusion

The study investigated the impact of improvisation of learning resources on biology instruction in senior secondary schools from Ondo South Senatorial District. 350 students from the senior secondary schools in Ondo State Senatorial District were part of the sample. The findings show that the type of learning facilities that are available for teaching science are weighing balance, audio tape, textbooks, graphs, charts and maps; the findings also shows that there is positive impact of improvisation of learning resources on biology instruction in the senior secondary schools from Ondo South Senatorial

District as improvisation of learning resources makes students learn biology concepts quickly, understand more abstract ideas of biology and it makes the biology class interesting to students; the findings finally shows that there is no significant difference in the impact of improvisation of learning resources based on gender.

Recommendations

In the light of the above findings, the following recommendations were made:

1. Government and school administrators should make adequate provisions for the learning resources in teaching biology and encourage teachers to use them.
2. Science teachers should endeavour to attend seminars, conferences and workshops in order to acquire the necessary skills, knowledge and pedagogy to improvise learning resources.
3. The challenges regarding the use of learning resources should be collectively addressed by the stakeholders in education.
4. Only competent and qualified biology teachers should be allowed to teach biology in all secondary schools.
5. Teachers, irrespective of gender and school type, should be oriented onto the best ways of using improvised learning resources.

Abstract: This study examined the impact of improvisation of learning resources on biology instruction in senior secondary schools from Ondo South Senatorial District. The study sample was 350; and consisted of students randomly selected from 10 senior secondary schools in Ondo South Senatorial District of Ondo State in Nigeria. A self-developed inventory was designed and validated through pilot testing and administered to the sample for the data collection. The researcher personally visited the schools in Ondo South Senatorial District, thus 100% data were collected. The collected data were tabulated and analysed by using percentages, mean, standard deviation and t-test analysis. The major conclusions of this study were that the types of learning facilities that are available for teaching science are weighing balance, audio tape, textbooks, graphs, charts and maps; there is positive impact of improvisation of learning

resources on the biology instruction in the senior secondary schools and there is no significant difference between male and female students in the impact of improvisation of learning resources on biology instruction. Based on the finding of this study, major recommendations were made.

Keywords: Improvisation, Learning Resources, Learning Facilities, Audio Tape, Biology Instruction

Streszczenie: W niniejszym artykule zbadano wpływ improwizacji zasobów edukacyjnych na nauczanie biologii w szkołach średnich pierwszego stopnia w południowym okręgu senatorskim Ondo w stanie Ondo w Nigerii. Próba badawcza liczyła 350 osób i składała się z uczniów wybranych losowo z 10 szkół średnich. Samodzielnie opracowany kwestionariusz został zaprojektowany i zatwierdzony przez testy pilotażowe, a następnie zastosowany w celu zebrania danych. Zostały one zestawione w tabelach i poddane analizie. Wyniki przedstawiono przy użyciu procentów, średniej, odchylenia standardowego i analizy t-testu. Badania pokazały przede wszystkim, że: do nauczania przedmiotów ścisłych dostępne są urządzenia edukacyjne, jak – waga, taśma audio, podręczniki, wykresy, diagramy i mapy; istnieje pozytywny wpływ improwizacji zasobów edukacyjnych na nauczanie biologii w szkołach średnich pierwszego stopnia i nie ma znaczącej różnicy między uczniami płci męskiej i żeńskiej w zakresie wpływu improwizacji zasobów edukacyjnych na nauczanie biologii. Na podstawie wyników tego badania sformułowano główne zalecenia.

Słowa kluczowe: improwizacja, środki dydaktyczne, udogodnienia nauczania, taśma audio, instrukcja biologii

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