BIOLOGY TEACHERS' ATTITUDE TOWARDS PRODUCTION AND UTILISATION OF INSTRUCTIONAL MATERIALS IN SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA

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ABSTRACT

This study investigated the attitude of biology teachers towards the production and utilisation of instructional materials in the teaching of biology. A descriptive survey research design was adopted for this study. In this survey, simple random sampling technique was used in selecting one hundred and twenty teachers from twenty secondary schools under study. A structured questionnaire was prepared, validated and used for collecting data. Percentages and t-test statistics were used in data analysis. Results shows that less than average number of teachers produce instructional materials for use when teaching; few teachers use microscopes, magnifying glasses, preserved specimen, models, quadrat and aquarium; and male teachers' perception of utilization of resources is significantly higher than their female counterparts. Appropriate recommendations were made for effective teaching/learning process which includes the use of immediate environment to teach concepts in the subject, and adequate plans should be made for training of biology teachers on improvisation and the usage of instructional materials for teaching Biology.

Keywords: *attitude, instructional materials, teacher, student*

INTRODUCTION

Education involves the socialization of individuals to become integral part of the society in which they live. Essentially, the science that was regarded as informal and indigenous was practiced in the pre-colonial era. It was stimulating, informative and useful (Okojie, 2007). It provided a lead way for understanding, interpreting and relating with the world and nature. Thus, Education is a behavioral characteristic. It influences skills, attitudes, belief, ability to reason, knowledge and any other form which enable one to adjust and interact effectively with other individuals. Through the acquisition of skills, it enables an individual and the group to proceed into the actualization of the individual's destiny. The limitations however are numerous especially in its inability to provide adequate scientific explanations for causes and events observed in the natural world.

Garuba, Agweda and Abumere (2012) noted that science embraces every attempt of humans to explore, interpret and manage the natural world. It is dynamic and essentially concerned with the search and explanation of both regularities and irregularities in nature. It involves the quest for actions and reactions, causes and effects in the environment. The purpose of science is to transform the environment towards improving the general quality of life, thus making the world a better place. The **s**chool environment is an organization where resources are produced, managed and organized in such a way that the students are able to acquire the desirable learning competencies.

Instructional materials are resources that aid teaching and learning. It helps to raise learning from verbalisation to practical aspect of teaching and learning. It stimulates students desire to learn, and assist the learning process by making assimilation and memorisation easy, (Kay, Naselaris, Prenger and Gallant, 2008). The use of instructional materials makes different continents to shape their rules and regulations, to accommodate one another. This is done by providing the socio-cultural and political differences and adjusting the traditional socio-cultural and political ways. An instructional material makes students understand more easily when the teacher makes use of working model. It makes the teacher's task easier and more effective. Olardi (1990) has highlighted the impact of instructional materials that teachers use to improve the students from understanding and perception of the subject as an enhanced aid. It brings clarity and creates recognition that allows them to have a realistic hand and a total knowledge of the subject. It enhanced learning, improve the competence of learners and makes learning more meaningful to students.

In Kaduna State, teaching and learning with instructional materials facilitates, stimulates and aids students to take active interest in any topic introduced by the teaching. In structural materials has emotional impact on the students of Kaduna State and affects their attitude towards what is presented as the topic to study by the teacher. It provides both the teacher and students with relevance and meaningful source of information. Kay (2008) noted that instructional materials stimulate the students desire to learn. It assists learning process by making assimilation and memorization of materials easy. Also, it helps to hold attention, include greater acquisition and, as well as objectives which may be in accessible to many students. An instructional material makes learning available to a wider audience, control the pace of learning, promote better understanding and help to overcome physical difficulties in presenting the subject content.

Resources utilization is the term coined to the process of managing and organizing instructional materials/resources. The utilization of resources in teaching brings about fruitful learning, since it stimulates students' sense and serves as a motivator. Denyer (1998) in his study on science games in National Curriculum in the United Kingdom reported that games when used as a resource enable less able children to stay on task and remains motivated for longer period.

There are resources that the science teacher can readily use to enrich the learning process. These include microscope, vivarium, herbarium, aquarium, plant press, culturing equipment, wind vane, rain-gauge, metre rule, models and charts (Olagunju, 2000). According to Umeoduagu, (2000) the resources should be provided in quality and quantity in Science Technology and Mathematics (STM) classroom for effective teaching-learning process. Nwoji, (1999) reported that essential facilities such as equipment like radio, television, computers, chemicals, specimens, video tape, stove, burners, models and charts are not readily available in schools. This inadequacy of teaching material resources, laboratory equipment/reagents/chemical and laboratory space, has been a serious concern to educators. Thus, biology teachers should exhibit good attitude towards improvising and the usage of instructional materials for teaching science subjects including biology at the Senior Secondary School (Chukwuka, 2013).

STATEMENT OF THE PROBLEM

Various studies have shown that the decline in performance in Science Technology and Mathematics (STM) may be connected with poor learning environment created by the poor state of infrastructural facilities (Fabayo, 1998 and Farombi,

1998). Mapaderun (2002) emphasized that the availability and adequacy of these facilities promote effective teaching and learning activities in schools while their inadequacy affects the academic performance negatively. Several efforts have been exerted by Science Teachers Association of Nigeria (STAN) to train secondary school teachers on improvisation techniques in various science subjects including Biology, hence there is need to evaluate how far teachers have been able to improvise instructional materials for effective teaching. Okereke (2009) noted that many schools in cannot boast of instructional materials. He contends that every government should take seriously the issue of making education her priority to help improve our standard of learning by providing the required instructional materials to schools. Obasi (2010) holds the view that government should provide funds to principals of schools who monitors the teaching staff to help principal provide the instructional materials needed by the students at all time.

Government at all levels has over the years placed enormous emphasis on instructional materials in shaping efforts and strategies aimed at improving students' standard of learning in the country, but both theoretical and empirical literature failed to capture the real factors as to why the standard of education in the country still remains low. This study therefore attempts to investigate the attitude of biology teachers towards production and utilization of instructional materials in teaching biology in secondary schools.

PURPOSE OF STUDY

The main purpose of the study is to determine the attitude of biology teachers towards production and utilisation of instructional materials biology in some selected secondary schools in Kaduna State, Nigeria.

Specifically, the study is aimed to determine;

i. the availability of instructional materials in these schools,
ii. the attitude of biology teachers towards production and utilisation of instructional materials and
iii. the extent to which biology teachers use these instructional materials.

RESEARCH QUESTIONS

1. What is the extent of the usage of instructional materials by biology teachers in secondary schools?
2. To what extent does the use of instructional materials enhance teaching and learning of biology in secondary schools?
3. What is the teachers' attitude towards production of material resources in Biology teaching?

RESEARCH METHODOLOGY

This research adopted the descriptive survey design of correlational type, which entails obtaining information about a wide variety of different variables including attitudes, opinions, preferences, and behaviours, and collection and analysis of data from a group selected from among the subject or study area. The selected groups were considered representative of the subject.

Area of Study

The study was carried out in Zaria Educational zone, comprising two Local Government Areas (Zaria and Sabon-Gari Local Government Areas)

Population of the Study

The population for this study includes all the senior secondary schools in Zaria Educational zone. As at the time of this study, there were twenty government owned schools with senior secondary

school section in Zaria Educational Zone. There are seven hundred and twelve (712) teachers in the senior secondary schools in the study area.

Table 1: Population of the study

S/No	Name of school	Location	Number of Teachers
1	GGSS, Dogon-Bauchi (Senior)	Sabon-gari	38
2	Aminu Government Secondary School	Sabon-gari	37
3	GSS, Chindit	Depot NA	40
4	GCC Muchiya	Muchiya	36
5	GSS Kwangila	Kwangila	39
6	GGSS Samaru	Samaru	37
7	GSS Bomo	Bomo	33
8	GSS Basawa	Basawa	34
9	Barewa College	Gaskiya	41
10	SSSS Kufena	Kufena	35
11	GSS Kofan Kibo	Zaria city	29
12	Alhudahuda College Zaria	Zaria city	40
13	GGSS (WTC) Zaria;	Kongo	40
14	GGSS Kofan Gaya	Zaria city	38
15	GSS Dakace	Dakace	36
16	GSS Gyallesu	Gyallesu	25
17	GSS Kofan Fada	Zaria city	30
18	GSS Tukur-Tukur	Gaskiya	31
19	GSS Magajiya	Zaria city	37
20	GGSS Tudun wada	Tudun wada	36
Total			**712**

Source: Zonal Inspectorate Office, Kaduna State Ministry of Education

Sample and Sampling Technique

The sample for this study was all teachers teaching biology in the study area. One hundred and twenty biology teachers were sampled for the study, using purposive sampling technique. This is shown in the table below:

Table 2: Sample of the Study

S/No	Name of school	Location	Number of Teachers
1	GGSS, Dogon-Bauchi (Senior)	Sabon-gari	8
2	Aminu Government Secondary School	Sabon-gari	6
3	GSS, Chindit	Depot NA	8
4	GCC Muchiya	Muchiya	4
5	GSS Kwangila	Kwangila	7
6	GGSS Samaru	Samaru	6

7	GSS Bomo	Bomo	6
8	GSS Basawa	Basawa	6
9	Barewa College	Gaskiya	8
10	SSSS Kufena	Kufena	7
11	GSS Kofan Kibo	Zaria city	4
12	Alhudahuda College Zaria	Zaria city	6
13	GGSS (WTC) Zaria;	Kongo	8
14	GGSS Kofan Gaya	Zaria city	6
15	GSS Dakace	Dakace	7
16	GSS Gyallesu	Gyallesu	3
17	GSS Kofan Fada	Zaria city	5
18	GSS Tukur-Tukur	Gaskiya	5
19	GSS Magajiya	Zaria city	6
20	GGSS Tudun wada	Tudun wada	4
Total			**120**

Instrument for Data Collection

The instrument employed in this study was an adapted structured questionnaire titled "Biology Teachers' Resources Production and Utilisation Questionnaire (BTRPUQ)." It consist of three sections; A, B and C. Each of the section asked specific questions from the targeted respondents. Section A is concerned with information on personal data, while sections B entails items on teachers' attitude use of instructional materials. This section contains 15 items. Section C contains 15 items that elicit information on production and utilisation of instructional materials in teaching biology.

Three experts in Science Education Department, Ahmadu Bello University, Zaria, validated the instrument. In conducting the reliability for the questionnaire, Section B and C of the instrument has a test-retest reliability of 0.71 over a period of two weeks. This showed that the instrument is consistent and reliable for the study.

Data Collection Procedure

One hundred and twenty questionnaires were directly administered to the biology teachers in the science laboratory of the respective schools to avoid test anxiety among the respondents. The respondents were given adequate time to complete the questionnaire and was personally collected by the researchers.

Method for Data Analysis

The data collected was analysed using simple percentage and t-test statistics. The data collected were represented in tables.

Presentation of Results

The results of the data collected were displayed in tabular forms.

Research Question 1: What is the Extent of the Usage of Instructional Materials by Biology Teachers in Secondary Schools?

Table 3: Extent of the Usage of Instructional Materials by Biology Teachers in Secondary Schools

S/N	**Statements**	**Always %**	**Sometimes %**	**Not used %**	**Mean**	**Sd**
1	How frequent do you use the microscope?	- (0.0)	116 (96.7)	4 (3.3)	1.95	0.23
2	How frequent do you use the magnifying glasses?	11 (9)	72 (60.1)	37 (30.9)	1.78	0.59
3	How often do you use the hand lens?	52 (43.4)	68 (56.7)	- (0.0)	2.43	0.50
4	How frequent do you use the preserved specimens?	18 (15)	85 (70.8)	7 (5.8)	1.99	0.56
5	How often do you use the food test reagents and chemicals in the laboratory?	41 (34.2)	61 (51)	18 (14.9)	2.19	0.67
6	How frequent do you use the measuring cylinders?	35 (29.2)	66 (54.9)	19 (16)	2.13	0.66
7	How frequent do you make use of the wall charts?	61 (50.9)	59 (49.1)	- (0.0)	2.44	0.67
8	How often do you use the models?	16 (13.2)	70 (58.4)	34 (28.4)	1.73	0.68
9	How frequent do you use quadrats?	- (0.0)	56 (46.7)	64 (53.3)	1.40	0.61
10	How frequent do you visit aquarium with your students?	- (0.0)	43 (35.6)	77 (64.4)	1.35	0.48
11	How frequently does the use of material resources help you to communicate with your students?	71 (59.3)	38 (31.7)	11 (9)	2.46	0.77
	Weighted Average	**1.99**			**66.2%**	

Table 3 reveals that microscope, magnifying glasses, hand lens, preserved specimen, chemicals, measuring cylinders, wall charts and models are sometimes used. (Mean score = 1.99, 2.19 and 2.43) but quadrat and aquarium are not used. (Mean score= 1.40 and 1.35).

The weighted average mean score is 1.99 which gives the proportion to be 66.2%. This implies that the teachers perceived that these materials are sometimes used. Thus, biology teachers in teaching do not frequently use instructional materials.

Research Question 2: To What Extent does the use of Instructional Materials Enhance Teaching and Learning of Biology in Secondary Schools?

Table 4: Use of Instructional Materials to Enhance Teaching and Learning

S/N	Method	Frequency/Percentage %			
		Yes	No	Mean score	Sd
1	Using equipment to collect materials e.g insect nets, quadrat, hook, transect, cage etc helps students learn effectively	68 (56.67)	52 (43.33)	2.15	0.45
2	Making charts improves students memory	79 (65.83)	41 (34.17)	1.98	0.61
3	Making models helps in learning	77 (64.17)	43 (35.83)	2.23	0.58
4	Using plants and animals is enhances learning better	107 (89.17)	13 (10.83)	2.19	0.53
5	Culturing e.g aquarium, vivarium, terrarium, herbarium, snailery, pigry, goatry, rabbitry, poultry are major instructional aids	79	41	2.02	0.69
6	Preserving/dissecting/staining on slides in bottles with formalin, alcohol etc. produces effective instructional materials	112	8	2.13	0.66
7	Using waste materials e.g empty tins, bottles, cans enhances learning	65	55	2.44	0.67
8	Using students' collections as an instructional aid	83	37	1.98	0.45
	Weighted Average	**2.13**	**76.3%**		

Tables 4, shows perceptions of the teachers on the use of instructional materials to enhance teaching and learning. 45% indicated that they produce resources by themselves. 57.5% produce commercially, 60% produce through collaboration with local government, 72.5% produce with nearby institution, 15% produce with federal or national agencies and 14% produce for resources centres. This shows that generally, less than average number of teachers does produce material resources.

Table 4 reveals how the few teachers produce materials. 51% of the teachers use collecting equipment to collect materials, 71.7% use charts, 10% make models, 89.3% use plants and animals, and 50.9% use cultured materials 93.4% of the teachers use preservation/dissection/staining on slides, 45.9% used waste materials e.g cans, empty tins, bottles etc and 69.2% collect their own materials through their students.

Research Question 3: What is the teachers' attitude towards improvisation of material resources?

Table 5: Teachers Attitude towards Improvisation

S/N	Statement	Yes/%	No/%
1	Do you improvise material resources with available materials from your local environment?	89 (74.2)	31 (25.9)
2	Do you believe that things around can be used for improvisation?	102 (85)	18 (15)
3	Do you believe that improvised materials improve students learning?	91 (75.83)	29 (24.17)
4	Do you think students should be involved in improvisation of resources for teaching biology?	78 (65%)	42 (35%)

Table 5 reveals that majority of the teachers do improvise materials from available materials from local environment (74.2%) and they did believe that things around can be used (85%). Also, they believe that improvised materials improve students learning (75.83%) and students should be involved in the improvisation of resource materials in the teaching of biology. This shows that the teachers have positive attitude towards improvisation of materials. This entails that they are highly interested in production and improvisation of biology material resources. This is related to similar researches by Olagunju and (2000), Ezeudu (1997).

DISCUSSION OF FINDINGS

From the perceptions of the teachers on the production of teaching resources, 62.0% indicated that they produce resources by themselves. This shows that generally, less than average number of teachers do produce material resources by themselves.

Moreover, table 2 reveals that few teachers produce materials 77% of the teachers make models and 65% use waste materials e.g cans, empty tins, bottles etc. In essence, above 50% of the teachers had positive perceptions of production of material resources and few of them (less than 50%) do not produce material resources like models and waste materials. This relatively aligns with previous studies of Olagunju (2000); Olagunju (2003); Egbegbedia (1997) and Sobulo (1998).

The findings reveal that microscope, magnifying glasses, hand lens, preserved specimen, chemicals, measuring cylinders, wall charts and models are sometimes used. (Mean = 1.99, 2.99) but quadrats and aquarium are not frequently used. (mean = 1.40). This implies that the teachers perceived that these materials are sometimes used and their perception can be rated up to 66.2%. That is, biology materials resources are available and used in schools. This finding is similar to that of Akano (2005) and Eze (2002) who rightly pointed out that resources can only be utilized when they are available and that there should be investment in this regard in educational institutions for proper utilization of materials resources and skills for effective teaching of Science Technology and Mathematics (STM).

CONCLUSION

In this paper, the attitude of biology teachers towards production and utilization of biology material resources are presented as indispensable tasks in the scientific enterprise to enrich the teaching and learning of biology as a subject, and push backwards the frontiers of ignorance on the part of students. The biology teacher must improvise, produce and use both

materials and ideas to aid instruction at all times. Some issues that could aid adequate training of teachers in production and utilization of available biology material resources should be highlighted in the teacher education curriculum and instruction.

RECOMMENDATIONS

On the premise of the above findings, the following recommendations are made:

1. The biology teacher should always use his immediate environment to teach as it contains many material-resources for effective teaching of the concepts in the subject.
2. The Federal and State Ministries of Education should make appropriate plans to expose biology teachers to workshops on improvisation in order to update their techniques for improvising specific equipment like quadrats, aquariums, plant press, among others.
3. Government should make funds available and sponsor the teachers' attendance at conferences, seminars and workshops on biology resources production, utilization and management.
4. Creative and resourceful teachers who improvise equipment and materials should be rewarded and motivated adequately.
5. There is need for non-governmental organizations, Parent Teachers Association, Voluntary Organizations and philanthropists to join hands in procuring necessary biology materials resources in schools.
6. Biology teachers should select the cheapest available equipment for demonstration or illustration of principles and concepts in science teaching. The functionality and duration of equipment should be taken into consideration.

REFERENCES

Akano, B.U. (2005). The use of the Local Materials in the Teaching and Learning of Science in the Primary School. *A paper presented in 1st Science Workshop, Science Teachers Association of Nigeria on May 2005 at FCE Kontagora*.

Anaekwe M.C. (1997). Effects of Students Interaction Patterns in Cognitive. Achievement, Retention and Interest in Chemistry. Unpublished Ph.D Thesis University of Nigeria Nsuka.

Awoniyi,M.A.(1999). *Selection and Designing of Instructional Aids.* Ibadan: University Press, 50-51.

Chukwuka, C. O. (2013). Teaching and Learning- Effect of Improvised Materials in Biology among Secondary Schools in Njikoka Urban of Anambra State. *STAN Proceedings, 2013 Ajumogbobia Memorial Conference,* 189-201.

Denyer, G (1998). "Science Games in the National Curriculum". *Science Education Newsletter,* 140, 5 – 6.

Egbegbedia, E.A. (1997). An Investigation into the Attitude of Primary School Teachers towards Improvisation in Primary Science Teaching in Niger State. *38th Annual Conference Proceedings of Science Teachers Association of Nigeria,* 285-289

Eze, S.U. (2002). Effect of Target Task Approach on Students Achievement and Interest in Senior Secondary School Physical Chemistry. Unpublished PhD Thesis, University of Nigeria, Nsukka.

Ezeudu F.O (1997). Availability and Extent of Improvisation of Instructional Materials in

Integrated Science at Junior Secondary School level in Enugu State of Nigeria, *38th Annual Conference Proceedings of Science Teachers Association of Nigeria,* 204-208.

Fabayo, O.R (1998). Evaluation of Some Aspects of Schools Quality in Secondary Schools in Kwara State. Unpublished Ph.D thesis, University of Ibadan.

Farombi, M. (1998) Resources Concentration Utilization and Management as Correlates of Students' Learning Outcomes Study of Quality in Oyo State. Unpublished Ph.D Thesis, University of Ibadan.

Garuba, M. A.; Agweda, F. E. & Abumere, D. I. (2012). The Contribution of Science and Technology Education to National Development: The Nigerian Experience. *Journal of Education and Practice,3(1),* 16-22.

Ibe, E. (2004). Effect of Gender and teaching Methods on Science Process Skills Acquisition among Senior Secondary School Students. *Journal of Educational Foundation (IEF) 1(1),* University of Nigeria Nsukka. 67-73

Kay, K. N.; Naselaris, T; Prenger, R. J. & Gallant, J. L. (2008). Identifying Natural Images from Human Brain Activity. *Journal of Human Nature 452,* 352-355. Retrieved from http://www.ncbi.nlm.nih.gov

Madu, B.C (2004). Effects of A Constructivist-Based Instructional Model on Students' Conceptual change and Retention in Physics. Unpublished Ph.D. Thesis, University of Nigeria, Nsukka

Mapaderun, O. (2002). *Teaching Method for Business, Science Social Science and Technical Education*, Ibadan: Holyem Communications

Nwoji, Queen, J. R. (1999). Evaluating the Use of Learning Resources for Primary Science Education. Implications for Learners: *40th Annual Conference Proceedings of Science Teachers Association of Nigeria (STAN)*, 245 – 249

Okojie, J. A. (2007). Higher Education in Nigeria. *Being a Paper presented at Education in Africa Day, held at House of commons palace of Westminster, London*. Retrieved from http://www.nucnigeriainfo/es%20houseofcommons.ppt

Olagunju, A. M. (2000). An Investigation into Teachers Attitude Towards and Extent of Improvisation of Resources for Effective Teaching of Biology. *41st Annual Conference Proceedings of Science Teachers Association of Nigeria (STAN),* 120 – 125.

Olagunju, A. M. (2003). Science Education Students' Level of Awareness and Utilization of Information and Communication Technology: Implications for Tertiary Institutions. *44th Annual Conference proceedings of Science Teachers Association of Nigeria (STAN),* 99-104

Olagunju, A. M. & Abiona, O. F. (2008). Production and Utilization of Resources in Biology Education. A Case Study of South West Nigerian Secondary Schools. *International Journal of African & African American Studies 7(2).* 49-56.

Sobulo, E.A. (1998). Need for Improvisation of Resources for Effective Teaching of Environmental Education Topics in Biology. An Unpublished B.Ed Project, University of Ibadan.

