THE EXTENT OF AVAILABILITY AND UTILIZATION OF BIOLOGY EQUIPMENT/MATERIALS IN SECONDARY SCHOOLS IN ONITSHA EDUCATION ZONE: IMPLICATIONS FOR SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT IN NIGERIA

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Abstract
This study examined the extent of availability and utilization of biology equipment/materials in secondary schools in Onitsha education zone: Implication for economic crisis in Nigeria. Three research questions were formulated and answered. The population of the study consisted of all the 48 biology teachers and 49040 Senior Secondary Two (SS 11) biology students totaling 29088 subjects in the thirty-two (32) secondary schools in Onitsha Education Zone. The sample consisted of 20 biology teachers and 500 SS 11 biology students 520 subjects in 10 randomly selected schools. Data was collected using summated rating scale, and was analyzed using percentages and mean. The result of the study showed that biology equipment/materials were on the average rarely available in the secondary schools and the available ones were not utilized. The implication of rare availability and low utilization of biology equipment/materials were discussed. It was concluded that for Nigeria to overcome the present economic crisis, biology equipment and materials must be made available and also be utilized maximally to make our biologists self-reliant and thereby rise above poverty and backwardness.
Keywords: Availability, utilization, scientific and technological development.

Introduction

For any science is to be taught well, it should be done practically. Each student should be able to perform necessary experiment, use certain tools, produce some equipment, make and record accurate observations and as the case may be. Science is the key to economic, intellectual, sociological, human resource development and the wellbeing of the society. The growth of any nation is a measure of its advancement in science. As soon as individuals are made to acquire the right attitude and skills in science for self-reliance and national development, then that society becomes developed.

It is unfortunate however that in most secondary schools, the equipment, facilities and materials needed for meaningful work are either grossly inadequate or in bad state of repairs. Teachers also lack the competence, skills and creativity to organize practical classes in biology (Ofogbu, 2003, Akubuilo, 2004). Ebele in Yahya and Shamsudeen (2017) observed that in most of the schools in Anambra State, there are inadequate equipment for teaching of biology in all the Secondary Schools in Nnewi

Education Zone of Anambra State. Again, Bello (2013) reported that most schools in Sokoto State do not have well equipped biology laboratory. It is essential that students do something more than listening to lectures. They should participate in demonstration and experiment. They must have experience even if it is as simple as swinging a bunch of keys, hanging on a string and timing the pendulum. (Novak in Olajide and James, 2009).

The issue of economic crisis has been ravaging our nation for some time now. What the nation requires is the type of education that can help our students discover their talents at a very early age and also encourage them to develop and utilize their talents well. One way this researcher thinks this can be effectively done is encouraging pupils to find out things for themselves. This cannot be done where there is unavailability of biology equipment. The use of equipment/materials for teaching biology actually motivates and arouses interest in students in a lesson. It focuses students' attention and initiates problem-solving. If materials for teaching biology are made available, our students will be self-reliant after graduation and this will go a long way to alleviate the present economic crisis in Nigeria.

For Nigeria to meet up with other developed countries of the world, greater emphasis should be on the provision of equipment and materials needed for practical work in Science in general and biology in particular. Students should actually be given opportunity to discover, invent and get involved in the rapid expansion in science and technology. This is because, biology has made great impact in the development of this nation and its importance warrants the need to provide biology equipment in our secondary schools. If biology materials are adequately provided in our secondary school laboratories, students will be able to apply knowledge, communicate effectively, be analytical, critical thinkers, inquisitive and imaginative. They need to be self-confident, motivated learners, creative and curious (NBTE, 2006).These attributes have a lot of implications for economic crisis in Nigeria. Once an individual acquires the right skills and attitude through manipulation of science equipment, he can survive easily in the society.

Statement of the Problem
Biology is one of the science subjects in Nigerian Secondary Schools. It is important in many ways for both individuals and societal development as seen in biotechnology and genetic engineering. Good knowledge of the subject is required for an individual to rise above poverty and backwardness especially in the light of the present economic crisis. Available statistics from West African Examination Council (WAEC, 2004-2012), Ofoegbu (2003) and Akubuilo, (2004) revealed that although biology has the highest enrolment relative to other science subjects, it records a very poor performance at senior certificate examinations especially in the practical examinations where students exhibit very poor science skill acquisition. The poor science skill acquisition by students is not in keeping with the objectives of

education in Nigeria which states that "education should aim at helping the child acquire appropriate skills, ability and competence both mental and physical as equipment for the individual to live and contribute to the development of his society" (FRN, 2004). It is possible that provision and use of adequate biology equipment and materials in teaching and learning of biology may improve the situation. Consequently, the problem is: To what extent is biology equipment/materials available and used in our secondary schools?

Research Questions
The following research questions were answered:
1. To what extent is biology equipment/materials available in schools?
2. To what extent do biology teachers make use of equipment/materials in teaching?
3. What are the implications of non-availability and non-utilization of biology equipment/materials on global economic crisis in Nigeria?

Methodology
The study employed a survey research design. The population of the study comprised of all SS 11 Secondary School biology students in Onitsha Education zone. The Zone has a total of 32 schools in which there are 48 biology teachers and 29040 students. A total of 29088 persons therefore constitute the population.

The sample for the study consisted of all SS 11 biology students and biology teachers in ten (10) randomly selected secondary schools in Onitsha Education zone. The biology students in these 10 schools were 500 in number and teachers were 20. A total of 520 subjects therefore constituted the sample for the study.The instrument used in this study for data collection was a questionnaire of 5-point Likert-type scale. The questionnaire was divided into two parts; Part 1 for biology teachers and Part 11 for biology teachers and SS 11 students.

Copies of the questionnaire were administered to the respondents by the researcher with the help of four research assistants. The biology teachers and students gave maximums cooperation in filling the questionnaires on the spot, resulting in 100% return of the questionnaires.

The statistical tools used in this study for data analysis were mean and percentage. Mean values of less than 1.50 was taken as never/very strongly disagree. Mean values of 1.50-2.54 was taken as rarely/strongly disagree. Mean values of more than 2.54 but less than 3.50 but less than 4.50 was taken as often/strongly agree. Mean value of 4.50 and above was taken as always/very strongly.

Results
Research Question 1: To what extent are equipment/materials available in secondary schools?

Table 1: Extent of availability of biology equipment/materials

Equipment/ materials	AA	OA	CA	RA	NA	TR Total	AM (X)	Remark
Quadrate	5	4	6	22	5	42	2.10	Rarely available
Measuring cylinder	5	4	6	32	0	47	2.35	Rarely available
Skeleton	10	8	12	22	0	52	2.60	Occasionally available
Overflow can	0	0	6	28	4	38	1.90	Rarely available
Dissecting equipment	0	4	3	20	8	35	1.75	Rarely available
Spring balance	0	8	6	20	6	44	2.20	Rarely available
Mounted pictures	20	16	24	8	0	68	3.40	Occasionally available
Handles	5	4	6	28	2	45	2.25	Rarely available
Flash card	0	0	6	28	4	38	1.90	Rarely available
Mosquito net	0	4	9	30	1	44	2.20	Rarely available
Rain guage	0	0	6	32	2	40	2.00	Rarely available
Laboratory funnel	50	12	9	8	0	79	3.95	Often available
Biological kits	0	0	6	32	2	38	1.90	Rarely available
Test tubes and rats	55	4	6	12	0	78	3.90	Occasionally available
Beaker	25	12	24	4	2	62	3.10	Occasionally available
Aquarium	0	0	0	36	2	38	1.90	Rarely available
Thermometer	10	4	6	30	1	51	2.55	Occasionally available
Microscope	0	8	12	28	0	48	2.40	Rarely available

Anemometer	0	4	0	24	6	32	1.60	Rarely available
Wind vane	0	4	3	32	2	41	2.05	Rarely available
Pooter	0	0	3	30	4	37	1.85	Rarely available
Sachi disc	0	0	0	20	10	30	1.50	Rarely available
Punnet square	0	0	9	30	2	41	2.05	Rarely available
Tape recorder	0	8	6	30	1	45	2.25	Rarely available
Fish trap	0	0	6	32	2	40	2.00	Rarely available
Sweet net	0	0	6	32	2	40	2.00	Rarely available
Transect	0	0	0	30	5	35	1.75	Rarely available
Incubator	0	0	6	30	5	35	1.75	Rarely available
Water filter	5	8	9	30	0	52	2.58	Occasionally available
Drying oven	0	0	6	34	1	41	2.05	Rarely available
Vacuum flask	0	12	9	32	0	53	2.60	Occasionally available
Herbarium cabinet	0	0	0	30	5	35	1.75	Rarely available
Charts	25	20	15	0	0	70	3.50	Occasionally available
Magnifying glasses	5	8	3	24	4	44	2.20	Rarely available
Dropping pipette	0	8	6	32	0	46	2.30	Rarely available
Bunsen Burner	10	4	6	30	0	50	2.50	Occasionally available
Model for eye	5	0	4	16	10	35	1.75	Rarely available
Model for ear	5	4	2	14	10	35	1.75	Rarely available
Model for heart	0	0	0	20	10	30	1.50	Rarely available
Regent for	0	0	6	16	9	31	1.55	Rarely

food test								available
Biological garden	0	0	0	0	20	20	1.00	Never available
Computer facilities	0	8	6	4	14	32	1.60	Rarely available
Bult, cells, battery	0	8	3	24	5	40	2.00	Rarely available
Preserved specimen	10	4	9	24	2	49	2.45	Rarely available
Secaleum	0	0	9	8	13	30	1.50	Rarely available
Vasculum	0	0	2	6	16	24	1.20	Never available
Plant press	0	0	6	2	16	24	1.20	Never available
Camera	0	0	0	0	20	20	1.00	Never available
Binoculars	0	8	0	8	14	30	1.50	Rarely available
Tripod stand	10	12	6	12	6	46	2.30	Rarely available
Fire extinguisher	0	0	9	10	12	31	1.55	Rarely available
Water bath	0	0	0	2	19	21	1.05	Never available
Round and fat bottom flask	0	8	9	6	12	35	1.75	Rarely available
Demonstration table	50	16	18	0	0	84	4.20	Often available
Petridish	20	12	6	16	3	57	2.85	Occasionally available
Prepared slides	10	4	6	8	10	38	1.90	Rarely available

						2.11	Rarely available

AA-Always available, OA-often Available, OA-occasionally available, RA-rarely available, NA-Never available, TR-total rating, AM- Arithmetic mean.

From table 1, it was observed that out of fifty-six (56) equipment/materials listed for effective teaching and learning of biology, five (5) (8.9%) were found to be never available; 40, (71%) were found to be rarely available; Nine (9) (16.07%) were found to be occasionally available. Finally two (2) (3.6%) items were found to be often available in schools. Accordingly, biology equipment/materials were on the average rarely available in secondary schools.

Research question 2: To what extent do biology teachers make use of available biology equipment?

Table 2: Extent of use of biology equipment by biology teachers.

Item	AU	OU	CU	RU	NU	TR Total	AM	Remark
Quadrate	0	0	0	4	18	22	1.10	Never utilized
Measuring cylinder	5	4	6	4	11	32	1.60	Rarely utilized
Skeleton	0	0	6	4	16	26	1.30	Never utilized
Overflow can	0	0	3	2	18	23	1.15	Never utilized
Dissecting equipment	0	0	3	2	18	23	1.15	Never utilized
Spring balance	0	4	3	4	16	27	1.35	Never utilized
Mounted pictures	20	12	15	20	3	70	3.50	Often utilized
Handles	0	0	9	6	14	29	1.45	Never utilized
Flash card	0	0	0	0	20	20	1.00	Never utilized
Mosquito net	0	0	3	4	17	24	1.20	Never utilized
Rain guage	0	0	0	0	20	20	1.00	Never utilized
Laboratory funnel	0	0	9	6	14	29	1.45	Never utilized

Biological kits	0	0	0	4	18	22	1.10	Never utilized
Test tubes and rats	0	0	9	6	14	29	1.45	Never utilized
Beaker	0	0	12	10	11	33	1.65	Rarely utilized
Aquarium	0	0	0	0	20	20	1.00	Never utilized
Thermometer	0	0	3	4	17	24	1.20	Never utilized
Microscope	0	0	0	6	14	29	1.45	Never utilized
Anemometer	0	0	3	4	17	24	1.20	Never utilized
Wind vane	0	0	0	6	17	23	1.15	Never utilized
Pooter	0	0	0	0	20	20	1.00	Never utilized
Sachi disc	0	0	0	2	18	20	1.00	Never utilized
Punnet square	0	0	9	4	15	28	1.40	Never utilized
Tape recorder	0	0	0	6	17	23	1.15	Never utilized
Fish trap	0	0	3	2	18	23	1.15	Never utilized
Sweet net	0	0	0	0	20	20	1.00	Never utilized
Transect	0	0	0	0	20	20	1.00	Never utilized
Incubator	0	8	6	6	15	35	1.75	Rarely utilized
Water filter	5	4	9	8	11	37	1.85	Rarely utilized
Drying oven	0	0	0	0	20	20	1.00	Never utilized
Vaccum flask	0	0	9	12	11	32	1.60	Rarely utilized
Herbarium cabinet	0	0	0	0	20	20	1.00	Never utilized
Charts	15	12	12	8	5	55	2.75	Rarely utilized

Magnifying glasses	0	0	9	6	14	29	1.45	Never utilized
Dropping pipette	0	4	3	6	16	29	1.45	Never utilized
Burnsen Burner	0	4	3	9	15	31	1.55	Rarely utilized
Model for eye	5	0	4	16	10	35	1.75	Rarely utilized
Model for ear	5	4	2	14	10	35	1.75	Rarely utilized
Model for heart	0	0	0	20	10	30	1.50	Rarely utilized
Regent for food test	0	0	0	20	10	30	1.50	Rarely utilized
Biological garden	0	0	0	0	20	20	1.00	Never utilized
Computer facilities	0	0	0	10	15	25	1.25	Never utilized

TR-total rating, AM- Arithmetic mean.

From table 2, it was observed that out of 56 equipment/materials in the list, 39 (69.6%) were never utilized; 15 (26.8%) were rarely utilized; one (1) (1.8%) was occasionally utilized, and finally one (1) (1.8%) was often utilized. Accordingly biology equipment/materials in secondary schools were on the average never utilized.

Research question 3: What are the implications of availability and utilization of biology equipment/materials?
Table 3: The implications of availability and utilization of biology equipment/materials.

Item statement	VSA	SA	D	SD	VSD	TR	AM	Remark
Student react positively when they use equipment / materials in teaching and learning	1300	640	90	60	40	2130	4.09	Strongly Agree
Teachers use of science equipment / materials motivate students' interest in	1300	560	66	92	52	2070	3.98	Strongly Agree

	VSA	SA	D	SD	VSD	TR	AM	
biology								
Students perform well in topics taught with equipment/materials	950	960	60	76	32	278	3.99	Strongly Agree
Students taught without equipment/materials learn by rote leading to poor understanding of biological concepts	975	796	90	96	48	2005	3.86	Strongly Agree
Many biology teachers do not know how to use the available equipment	925	836	153	76	37	2027	3.89	Strongly Agree
Students cannot apply knowledge to real life situation when taught without equipment/materials	880	780	153	130	33	1976	3.80	Strongly Agree
Poor understanding of biological concepts may lead to production of biologists who cannot be self-reliant	840	792	201	124	25	1982	3.81	Strongly Agree
This poor understanding of biological concepts may be one of the causes of low rate of development in Nigeria	990	768	147	152	05	2062	3.97	Strongly Agree

VSA- very strongly agree, SA-strongly agree, D-disagree, SD- strongly disagree, VSD-very strongly disagree, TR-total rating, AM- Arithmetic mean.

From table 3, both biology teachers and students strongly agreed on the following points:

- Students react positively when they use equipment/materials in teaching and learning;
- Teachers' use of science equipment/materials motivate students interest in biology;
- Students perform well in topics taught with equipment/materials;

- Students taught without equipment/materials learn by rote leading to poor understanding of biological concepts;
- Many biology teachers do not know how to use most biology equipment/materials;
- Poor understanding of biological concepts may lead to production of biologists who cannot be self-reliant;
- Poor understanding of biological concepts may be one of the causes of economic crisis in Nigeria.

Discussion

The information in table 1 revealed that biology equipment/materials were on the average rarely available in secondary schools. Accordingly, 8.9 of the materials were never available in schools, 71 percent of materials were found to be rarely available, 16.01 percent of materials were found to be occasionally available in schools while 3.6 percent of materials were found to be often available. This result was supported by observations of earlier researchers. For instance, Achufusi, Umeh & Okoye (2009), Olangunji (2003) Ibukun (1992) reported serious lack of equipment/materials in the teaching and learning of biology. This may be why teachers most times avoid conducting practical work which in itself has implication for the academic performance of students. Laboratory equipment availability plays a vital role in determining the extent of acquisition of science process skills and competence in science concepts by the learner (Yahya and Shamsudeen 2017). Abuja, Katcha and Wushishi (2015) in Yahya and Shamsudeen (2017) reported that there is a significant difference between the performance of biology students exposed to well-equipped laboratory and those exposed to ill-equipped laboratory.

On a similar note, Table 2 revealed that biology equipment/materials were on the average never utilized by biology teachers. Accordingly, 69.6 percent of materials were never utilized, 26.8 percent were rarely utilized, 1.8% of materials were occasionally utilized and finally 1.8 percent were often utilized. This was supported by the findings of Olangunji (2003), Abudrauf, Alhassan and Jubril (2019) who reported low utilization of ICT facilities in Nigeria secondary schools of which biology equipment is part.

Again the information in table 3 revealed many implication of non-availability and low-utilization of biology equipment/materials which includes, poor understanding of biology concepts leading to rote learning, inability to apply knowledge to real life situation leading to lack of self-reliance. Some of these points were also highlighted by NBTE (2006). It also reveals teachers inability to use the available science equipment/materials. This was supported by the observations of Ofoegbu (2003) and Akubuilo (2004) who reported that teachers lack the competence, skills and creativity to organize practical classes in biology. This may be one of the reasons biology equipment and materials are never utilized in schools.

Summary and conclusion

Biology equipment/materials were on the average rarely available in secondary schools and the available ones were never utilized by biology teachers. This has a lot of implications which includes: poor understanding of biology concepts leading to rote learning, resulting in inability to apply knowledge of biology to real life situation.

 Science Education of which biology is one, is the bed rocks of technological breakthrough. Technologically advanced countries of the world attain their status partly through their knowledge of Science Education. Technological advancement is a must for any nation to rise above poverty and backwardness. It is a well-known fact that no technologically advanced country is poor. This buttresses the importance of availability and utilization of biology equipment/materials in secondary schools by biology teachers in the light of the present developing status of Nigeria.

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