

CHALLENGES FACED BY TEACHERS IN CONDUCTING BIOLOGY PRACTICAL IN ENUGU NORTH LGA OF ENUGU STATE NIGERIA

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Abstract: *The study investigated the challenges facing teachers in conducting biology practical in secondary schools in Enugu North Local Government. [our research questions and three null hypotheses guided the study. The review of literature in the study was organized under conceptual framework, theoretical framework and review of empirical studies. Kolb experiential theory and Vygotsky's social learning theory were reviewed under theoretical framework. A descriptive survey design was adopted for the study. The study was carried out in Enugu North Local Government Area of Enugu state. The population was the same with the sample size which was 27 respondents. The instrument for data collection in this study was a questionnaire. Data collected from the respondents were analyzed using mean and standard deviation. The results revealed that teachers face numerous challenges ranging from non-availability of laboratory resources, unconducive learning environment, poor in-service training of biology teachers and poor student attitude towards biology practical. In line with the findings of the study, the educational implications were highlighted and recommendations made which include among others that the ministry of education should through its agencies make sure that laboratory resources are adequately provided. Finally, the limitations of the study and suggestions for further studies were made.*

Keywords: *challenges, teachers, biology practical, Enugu North L.G.A*

How To Cite

Onyedikachi, U. D., & Onukwube, V. O. (2022). Challenges Faced By Teachers In Conducting Biology Practical In Enugu North Lga Of Enugu State Nigeria. *Journal Of Research In Science And Vocational Education (Jrsve)*, 2(1). Retrieved From <https://jrsve.com/index.php/jrsve/article/view/16>

Introduction

Science is a systematic process of obtaining verifiable and testable knowledge about nature through theoretical and practical activities. Development in science over the years have influenced and dominated every aspect of human endeavour such that any individual lacking, in scientific literacy find it very hard to survive in the contemporary society. For any nation to attain this rapid scientific growth and advancement, it is important that such a nation

improve the standard of her educational system especially in science related areas.

Science is both a process (scientific method) and a product (knowledge, fact and principles) (Ezeh, 2013). Both the process and product of science are acquired through education and this is specialized type of education such as science education. Science plays important roles in the society because it relates to our daily life and career. The importance of science in our society made the Federal Government of Nigeria, through the Federal Ministry of

Education to introduce science subjects in the nation's secondary school curriculum. Biology is one of such subjects introduced.

Biology is a branch of science that deals with the study of living things, which includes human-beings (Michael, 2012). Biology has many branches which include; histology botany. Ecology genetics. morphology, anatomy. physiology, histology, microbiology, evolution; cell biology to mention but a few. Many societal issues are biology-based. These include biodiversity, genetically modified organisms, reproductive technologies, prolongation of life, food production, tourism industry (biological gardens) and processing industries. All of these issues have involved improvements that meet human needs and so this 21st century has been considered as the age of biology' (Reiss, 2019). The knowledge of biology helps in checking environmental degradation such as desertification, erosion, water hyacinth, land, air and water pollution.

The cardinal objectives of biology education are to prepare students to acquire adequate laboratory and field skills in biology; meaningful and relevant knowledge in biology; ability to apply scientific knowledge to everyday life in matter of personal and community health and agriculture; lastly reasonable and functional scientific attitudes (Federal Ministry of Education, 2014). Despite the importance of biology, students' achievement in the subject from West African Secondary School Certificate Examination (WASSCE) has been poor (Eze, 2019). Available data on students' performance in biology in School Certificate revealed that on the average, more than 80 percent of students scored below credit level in the past three years in the WASSCE; the aspects of biology which students find difficult in WASSCE are practical questions on food test, examples carbohydrates, proteins and fats/oils indicates that students lack basic practical principles such as observation, and interpretation of the specimens provided For the examination (WAEC Chief Examiners Report, 2017, 2018 & 2019). Enebechi (2010) stated that some biology teachers fail to conduct biology practical along-side every topic treated during lessons, until a few days to examination when they will use WAEC specimens to conduct practical for their students. Eze (2011) inferred that practical work is a unique strategy of teaching and learning of biology because it enables science students to observe and manipulate materials to demonstrate certain

aspects of the subject matter, which have been learnt in the class through lectures, discussion and textbooks. Adesoji (2016) opined that there is need for change from the current method of teaching biology to learner- centered instructional approach such as inquiry method that will enable students carry out experiments within or without the laboratory.

Inquiry method is students - centered approach of teaching and learning that allows students to find out facts themselves with the assistance of the teacher who serves as a facilitator. Inquiry learning is a form of active learning where progress is assessed by how well students develop experimental and analytical skills rather than how much knowledge they possess. According to Hanson (2015) learning becomes more effective and long lasting when learners plan their own questions, analyze and discuss their findings and finally construct their understanding. Hewson (2012) further maintained that inquiry based instruction is not only concerned with the preparation for lifelong learning but also extends knowledge beyond the classroom doors which enable students to experience events like real scientists. The essence of inquiry is to ask questions that stimulate students to think critically, construct knowledge using scientific processes such as observing, classifying, measuring, inferring, predicting, formulating models, interpreting data, hypothesizing and experimenting which help students to build knowledge and communicate what they have learned. The inquiry teaching method is mostly carried out in the science laboratory where the students are provided with science equipment and materials for experiments (Okoli, 2016).

Laboratory works are activities or investigations that are carried out in the laboratory which provide students the opportunities of becoming more knowledgeable with science practical skills, which include observation, identification, classifying, hypothesizing, predicting, measuring and experimenting. Nzewi (2018) asserted that laboratory activities can be regarded as a strategy that could be adopted to make the task of teaching more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of subject matters.

Laboratory activities have played a special and central role in science education for a long time, and science educators believe that engaging students in laboratory activities has many benefits: they stimulate creativity, curiosity and

critical thinking, promote students engagement with the scientific methods and encourage active learning and problem-solving approach. Laboratory activities also provide opportunities to collect, analyze data and apply mathematical knowledge to support and illustrate concepts, facts and principles (Garnett, 2015). Laboratory practical works provide a way not only for developing varieties of different practical skills but also developing favourable attitudes, interest, pleasure, enthusiasm, imitation, imagination and cooperation among students (Nworgu, 2019).

Despite these benefits of the usage of laboratory in teaching biology, teachers still face numerous challenges in using it. Practical works is very important in the teaching and learning process of biology so it must be taken seriously by all biology teachers. Abimbola (2010) stated that the content of science is highly complex and abstract. Students need to participate in inquiry to appreciate the spirit and methods of teaching science. Practicals are naturally interesting to students. It is of great importance to make sure practicals are conducted with learners for them to understand better. Mpuma (2013) posited that the challenges encountered by teachers in conducting practical include poor student attitude towards laboratory practical, teachers' poor pedagogical skills, unconducive learning environment, unavailability of laboratory resources. Mpuma also believed that teachers perception their learners is another huge factor that affects the conducting of practical in laboratory. The author believed teachers who perceive their learners to be motivated and non-disruptive are more likely to engage learners in higher-level types of practical in biology.

Another factor is the attitude of biology teachers towards innovation. Schools where innovation is highly supported have biology teachers engaging more in practical works in biology. The other most important factor is availability of physical resources (e.g. laboratories, science apparatus or portable laboratory stations) and teachers' motivation towards biology practical. Those teachers who are motivated to do biology practical will always find ways to do so even if they are in poorly resourced schools but those who are not motivated will not do biology practical even when they have access to the best of resources (Adewumi, 2018).

Ugwu (2012) stated that biology teachers encounter many obstacles when conducting practical inquiry teaching. The

obstacles include "the teachers' lack of class size, students' motion and ability, teachers' weak understanding on the nature of biology, inappropriate curricula, lack of pedagogical skills, conflicts between the ideal standards and the realities of biology classes and typical school culture". Biology Practical is one of the most challenging tasks for biology teachers, for that reason it is practiced rarely or incompetently in many schools. [The various reasons suggested for teachers' reluctance in adopting laboratory practical include the lack of external support such as limited time, large number of students, unavailability of resources and the absence of trained laboratory assistants.

Researchers (Babaide, 2010; Cengiz, 2010) have found out that teachers encounter some problems in laboratory works, such as lack of acquisition of desirable skills (poor observation of specimens, poor identification of specimens, drawing of specimens and poor recording or reporting of practical works). These problems make it difficult for teachers to carry out laboratory practical work thereby concentrating on theoretical knowledge during classroom teaching and learning processes. These challenges may be grouped into school-related factors, teacher-related factors and student-related factors. This led the researcher to find out the challenges teachers face in using laboratory practical to teach practical Biology in Enugu North Local Government Area Enugu state.

Purpose of the Study

The main purpose of this study is to investigate the challenges facing teachers in conducting biology practical in senior secondary schools in Enugu North Local Government Area. Specifically, the study determines;

1. The extent of non-availability of laboratory resources hinder the conduct of biology practical in secondary schools
2. The extent unconducive learning environment poses a challenge in conducting biology practical in secondary schools
3. The extent poor in-service training of biology teachers hinder the conduct of biology practical in secondary schools
4. The extent poor student attitude hinder teachers in conducting biology practical in secondary schools

Research Questions

The following research questions guided this study

1. To what extent does non-availability of laboratory resources hinder the conduct of biology practical in secondary schools?
2. To what extent unconducive learning environment pose a challenge in conducting biology practical in secondary schools?
3. To what extent does poor in-service training of biology teachers hinder the conduct of biology practical in secondary schools?
4. To what extent does student attitude hinder the conduct of biology practical in secondary schools?

Method

Research Design

The research design used for this study is descriptive survey. According to Ude (2011), a survey research design is a procedure for obtaining information or research data directly from respondents who answer the questions by themselves. This design is a useful way of obtaining information about people's opinions, attitudes, preferences, and experiences simply by asking questions. This design is used for this study since a group of people have to be studied systematically by collecting and analyzing data from a group of respondents.

Area of the Study

The study was carried out in Enugu North Local Government Area of Enugu State comprises Independence Layout, Iva Valley, Coal Camp, and New layout Enugu North is at the center of Enugu State of Nigeria. The state is made up of seventeen (17) local government councils including Isi-uzo, Nkanu, Enugu North, Enugu South, among others. It covered all the nine (9) public secondary schools found in the local government. The choice of this area was because of the fact that the researcher noticed that despite the provision of laboratories in the schools in this local government, poor performance of students in practical biology is on the high side.

Population of the Study

The population for this study comprised all the Biology teachers in the public secondary school in Enugu North Local Government Area of Enugu State which is twenty seven (27). Statistical unit PPSMB Enugu Education Zone 2020/2021. The sample size is 27 respondents. The entire

population was studied due to the fact that the population size was manageable. Therefore, no sampling was done.

Instrument for Data Collection

A research questionnaire titled "Challenges facing Teachers in conducting Biology Practical (CTCBP) were used. The instrument developed by the researcher was used for the data collection. Questionnaire items were constructed to afford answer to the research questions formulated to guide the study. The questionnaire consisted of two sections. Section one sought information on personal data while the second section contains twenty (20) items structured to provide answers to the research questions. Four point rating scale of Very Large Extent (VLE), Large Extent (LE), Small Extent (SE) and Very Small Extent (VSE) with values of 4, 3, 2, and 1 respectively was used.

Trial test was carried out involving the Biology teachers in National Grammar school, Enugu. The school has the same characteristics with the schools that were studied. Cronhach Alpha was used to compute the reliability estimate. The result showed the reliability co-efficient of 0.86. 0.72. 0.74 and 0.74 respectively for clusters A. B. C and D and an overall reliability estimate of 0.80. This shows that the instrument was reliable.

Method of Data Collection

The instrument for data collection was administered by the researchers with the help of research assistants. These assistants were briefed on the purpose and nature of the study and how to distribute, collect and handle the retrieved copies of the questionnaire. This was necessary because in cases where it was not possible to collect the completed questionnaire on the spot, the research assistants helped the researchers in retrieving them at a later date agreed upon.

Method of Data Analysis

The data collected in the study were analyzed using mean and standard deviation, to answer the research questions, the responses from the respondents were compared, classified to the number of items the questionnaire for each research question.

Formular for mean:

Where -	Sum of
F	- Frequency
X	- Normal Value
N	- Total number of respondents

The nominal values assigned to the different scaling items used are as follows,

VLE = 4, LE = 3, SE = 2 and VSE = 1

To ascertain the decision rule; this formular was used

The criterion mean score was computed with the formula;

$$X = \frac{\sum fx}{N}$$

Where \bar{X} = mean, $\sum fx$ = summation of the frequency, N = Number of items

Results

Research Question One: To what extent does non-availability of laboratory resources hinder the conduct of biology practical in secondary schools?

Table 1: Extent Non-Availability of Laboratory Resources hinder the conduct of biology practical

S/N	Items	Mean	Standard Deviation	Decision
1	Practicals are not carried out because there are no specimens	3.49	0.67	Accepted
2	Inadequate reagents impede biology Practical	3.48	0.63	Accepted
3	Non-availability of dissecting kits makes Biology teachers avoid practical on dissection related topics	3.22	0.74	Accepted
4	Biology practicals arc not conducted because there are no apparatus and microscopes	0.15	0.72	Accepted
5	Because there are no storage media for specimens. biology practicals are not conducted	3.03	0.71	Accepted
Cluster mean		3.02	0.71	Accepted

From the Table, it showed that the respondents with a mean scores above 2.5 to shows that non-availability of laboratory is to a great extent one of the challenges facing teachers in conducting biology practicals.

Table 2: Extent does uncondusive learning environment pose a challenge in conducting biology practical

S/N	Items	Mean	Standard Deviation	Decision
1	Dilapidated laboratory buildings impede the running of biology practical	3.13	0.45	Accepted
2	Poor lighting of the laboratory room hinder the conduct of biology practical	3.27	0.66	Accepted

(weighted scale)

Any item that had mean 2,5 and above was accepted, while any item with mean below 2.5 was rejected. Therefore, 2.5 was the cut-off mean score for decision taken.

Research Question Two: To what extent does uncondusive learning environment pose a challenge in conducting biology practical in secondary schools?

3	Lack of security and emergency exit prevent the conduct of laboratory practical	2.28	0.44	Rejected
4	Poor school climate hinder effective biology Practical	2.39	0.42	Rejected
5	Poor ventilation in the laboratory room impedes the conduct of biology practical	3.36	0.78	Accepted
Cluster mean		2.82	0.77	Accepted

The result from the Table 2 revealed that the respondents agreed to items 1, 2 and 5 but rejected items 3 and 4. The cluster mean is 2.82 which means that the respondents agree that unconducive learning environment to an extent poses as a challenge to the conduct of biology practical.

Research Question Three: To what extent does Poor In-service Training of Biology Teachers hinder the conduct of biology practical in secondary schools?

Table 3: Extent Poor In-service Training of Biology Teachers hinder the conduct of biology practical

S/N	Items	Mean	Standard Deviation	Decision
1	Some biology teachers use traditional method of teaching thereby eliminating the use of laboratory practical	2.69	1.41	Accepted
2	Some biology teachers do not have the needed competencies in Biology and as such cannot handle practical	2.60	1.45	Accepted
3	Some biology teacher professional development are limited to a couple of in-service training sessions	2.33	1.61	Rejected
4	In-service training of biology teachers are not intensive enough to cause a change in behavior	2.22	0.97	Rejected
5	Shallow knowledge and lack of technical know how of biology teachers deviate their interest from biology practical	2.72	1.25	Accepted
Cluster mean		2.51	1.27	Accepted

Table 3 disclosed that items 1, 2 and 5 have mean scores that are above the cut-off mark of 2.5 that was regarded as acceptable limit as indicated by the researcher. Therefore, these items under poor in-service training of biology teachers were considered acceptable. however,

items 3 and 4 were rejected as the items were below the cut-off point.

Research Question Four: To what extent does Poor student attitude hinder Teachers in conducting of biology practical in secondary schools?

Table 4: Extent Poor student attitude hinder Teachers in conducting of biology practical

S/N	Items	Mean	Standard Deviation	Decision
1	Students see biology practical as waste of time and energy which discourages biology teachers	3.13	0.37	Accepted
2	Poor scientific attitudes of students hinder the conduct of biology practical	2.45	0.32	Rejected

3	Students view practical as a hard aspect of biology thereby discouraging the conduct of biology practical	3.33	0.67	Rejected
4	Students view biology practical as boring and therefore exempt during practical	2.73	0.29	Rejected
5	Students view biology as not important to their career and as such discourage the teacher from conducting biology practical	3.42	0.54	Accepted
Cluster mean		2.98	0.66	Accepted

The result from the Table 4 indicated that respondents disagreed with items 2 while they agreed in items 1, 3, 4 and 5. The cluster mean is above 2.5 which indicate that the respondents generally view poor student attitude toward laboratory practical as a challenge facing the conduct of biology practical.

Summary of Findings

1. Non-availability of laboratory resources is a major challenge biology teachers face in conducting biology practical.
2. Unconducive environment hinders the running of biology practical
3. Poor in-service training of biology teachers prevents them from carrying out biology practical
4. Student attitude to a reasonable extent discourages the teacher from carrying out biology practical

Discussion of Findings

From the **Research Question One**, it was seen that non-availability of laboratory resources hinder the conduct of biology practical in secondary schools. However, this connotes with the submission of Oludare (2016) that Biology laboratory physical structure as well as equipment is inadequate and Adesoji (2016) which stated that there are inadequate resources for teaching and learning of Science subjects in public secondary school in Nigeria. However those facilities that were not available may be improvised. The teacher should try to improvise instructional materials and encourage students to do the same. This gives students enough understanding of Biology concepts as the students' local environment will be used to source the materials. Biology as a school subject is very important in scientific and technological development of a nation. Its objective as contained in the national policy on Education, FRN (2014) include among others, to equip learners with meaningful and relevant knowledge of biology, adequate laboratory and field skills. The use of equipment/materials in teaching biology is subject to its availability therefore materials/equipment

must be available in order to make the objectives come to reality.

Alebiosu and Michael (2018) supporting the view stated that, certain facilities are most essential if school science laboratory is to be functional, relevant and productive. Apart From the adequacy of the laboratory human and material resources, there are required specifications for design of each of physics, chemistry, biology or any other science subject's laboratory. Laboratory facilities are needed in its entire ramification for the purpose of achieving specific goals, and aid or facilities can be used for instructional process and development. It is therefore imperative for teachers' to use instructional materials to make their teaching more interesting, effective, arrest and sustain more attention of the students for effective learning to take place. It is common knowledge that students do better through personal observation of objects or phenomena than hearing from a teacher alone, the laboratory practice is one of the best and most important instructional media for effective learning because it makes real what is abstract in this wise, students prefer experiments as they enable them to observe, classify and interpret results from concrete data laboratory practice, therefore practical activities is very important in biology lessons.

The finding agrees with the study of Muhammad (2017) which showed that most schools emphasis is more on the memorization of facts with a view to passing examination and less on the method of finding out the facts and learning to apply them. The findings also corroborated the assertion of Ihegbulern (2016) which stated that resource materials utilization during practical lessons inculcates in the students the spirit of careful observation, manipulative skills and creativity. When students are exposed to the use equipment/materials by their teachers during teaching and learning process they tend to perform better than when they are taught without using laboratory facilities, [support this assertion the findings of Ihejiamazu and Ochui (2016)

posited that the involvement of learner with laboratory equipment will eliminate abstraction of the concept learned. As learners are involved in laboratory activities they manipulate the equipment, conduct experiment, record scientific observation. This way basic scientific skills and attitudes are acquired that will help them both in performance and in future application of concept in everyday life. Teaching/ learning facilities improve the quality of teaching and make learning content meaningful. Biology teachers make best use of available facilities to enable learners make use of more than one senses in learning for better retention of knowledge however, the use of equipment/materials in the teaching of biology is subject to its availability.

From **Research Question Two**, the responses analyzed the extent uncondusive environment impedes the conduct of biology practical. The findings corroborate with the view of Nnachi (2009) who stated that uncondusive environments negatively affect cognitive growth of the learner. From this view point above, an environment that is devoid of safety, conduciveness, stimulation, and enriched resources tends to harbor insecurity for both the education provider and the client. The uneondusive nature of the present day education system is a very big environmental problem which endangers the learning activities within the school settings. The safety of any environment is the concern for employers and workers health in any given firm. It also agreed with Ogwa (2015) who aptly stated that the safety and health of a workplace is an integral component of the viability of business for employers and environmentalist generally. It is therefore imperative to say that every workforce in an organization including educational sector is entitled to safety of life and healthy living; this in essence will sustain the lives of personnel and ensure high level of productivity in an organization. Here uncondusive environment is determined by poor state of school environment.

Research Question Three focus was to establish the extent teachers poor in-service training pose as a challenge to conducting biology practical. The result of these findings as summarized in Fable 3 showed that pupils (respondents) overwhelmingly agree that poor teachers in service training cancels laboratory practical. The findings of this study tend to agree with the opinions expressed by Onochie and Okpalla (2015) that in-service training is the totality of educational and personal experiences that

contribute toward an individual being more competent and satisfied in an assigned professional role. The primary purpose of in-service training is to enable teachers to acquire new understanding and instructional skills.

It focuses on creating learning environments which enable teachers to develop their effectiveness in the classroom. In this aspect, in-service training for teachers is the driving force behind much change that has occurred in the art of teaching and learning. It is vital that teachers .keep up to date on the most current concepts, thinking and research in their field and also promote professional growth among teachers in order to promote excellent and effective teaching and learning environment for students. This agrees with Onochie (2015), who stated that in-service training for teachers enables the teachers to be more systematic and logical in their teaching style. in-service training is a planned process whereby the effectiveness of teachers ilectiveiy or individually is enhanced in response to new knowledge, new ideas and changing circumstances in order to improve, directly or indirectly the quality of pupil's education.

Research question Four traced the extent poor student attitude to biology hinder effective usage of laboratory. The result of this study revealed that a positive attitude toward school is important in today's environment. Inspiring and encouraging students to do well in school can be achieved through inquiry based science activities and laboratories. Young children are naturally curious and begin life as natural scientists (Louv, 2015). Llewellyn (2012) reported that inquiry is science, art and imagination combined, where students use critical, logical, and creative thinking to explore areas of personal interest, and that inquiry inspires students to be lifelong learners and to become independent thinkers. They observe, taste, listen, and touch to learn about their environments, much like how a scientist observes the world. Using students' natural curiosities improves their understanding and attitude toward biology.

Conclusion

The findings of this study revealed that the biology teachers in the are faced several challenges, which are preventing them from using practical works in teaching Biology. Notable among the identified challenges include the lack of well-equipped functional laboratories. These conditions often made thea teachers to use the theory method rather than practical work in teaching Biology at

schools. However, as part of measures to encourage the use of practical works in teaching Biology in the study area, the teachers indicated that relevant materials and equipments should be made available at the beginning of every academic year. Furthermore, it was indicated that capacity building workshops on improving and conducting practical works in Biology should be organised regularly for the teachers. Thus, meaningful efforts should be directed towards addressing the identified challenges in order to motivate the teachers to include practical works in their teaching of Biology.

Recommendations

Based on the findings of this study, and their implications,

1. The ministry of education through its subsidiaries schools should be provided with well-equipped laboratories and the necessary materials specified in the subject syllabus should be provided for use at the beginning of every academic year.
2. The school authorities should provide a laboratory assistant at the schools to help with the planning and conducting of practical works.
3. The school authorities should clear timetable provision should be made for carrying out practical works in the schools. This should be evidently clear to learners and teachers.
4. The schools' academic planners should ensure that topics with practical works that might be affected by weather are allocated within the right time of the year.
5. The ministry of education should through its parastatals organize capacity building workshops and conferences on a regular basis where science teachers are trained and can share experiences on how to use equipment and conduct certain practical lessons in Biology.

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