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EFFECTIVE IMPLEMENTATION OF BIOLOGY CURRICULUM IN SECONDARY SCHOOLS: A PANACEA TO IMPROVING BIOLOGY STUDENTS' ACHIEVEMENT IN ANAMBRA STATE

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Abstract
The study examined the effective implementations of Biology curriculum in some secondary schools in Anambra State. Descriptive survey research design was adopted in the study. The population of the study consisted of 3,115 SS2 biology students in public secondary school in Aguata Education zone. Simple random sampling was used to draw 200 SS2 biology students from the three local government areas that make up the education zone which include Aguata L. G.A, Orumba North and South L. G. A. Instruments for collection of data were questionnaire, achievement scores in biology, observation and interview. The statistical tools used in analyzing the data were frequency table and simple percentages. Findings therefore revealed that, the biology curriculum is not being effectively implemented in most schools by biology teachers. It was also found that instructional materials are lacking in teaching biology by the teachers. It was recommended among others that the government should employ more qualified teachers, laboratory assistants, cleaners with the adequate knowledge to handle both the theoretical and practical aspects of biology in an orderly manner to bring about effective implementation of the biology curriculum.

Keywords: Biology, Curriculum, Biology Curriculum, academic achievement, Instructional Material.

Introduction

Biology is a branch of science subject that deals with life. It plays an important in every aspect of human endeavour being that it relates to life. Asuzu and Okoli (2019) defined biology as a natural science that studies the living world; how it functions, what these functions are, how living things came into existence and their interaction with each other and their environment. In the view of Nwuba and Osuafor (2021) biology is a natural science that is concerned with the study of life and living organisms. It is a natural science that studies life and living organisms, including their physical structure, chemical processes, molecular interactions, physiological mechanisms, development and evaluation (Adam et al., 2022). Therefore, biology is a branch of science that deals with the study of living organisms, how they interact with each other and their environment.

As a subject, biology is very important in nation building as well as scientific and technological development. In the view of Uzoma and Okoli (2019) a sound knowledge of biology is needed in our everyday lives as well as in many fields of study and industries such as medicine, pharmacy, nursing,

agriculture, and engineering. In the same vein, Pat-Anyaeji and Okeke (2019) opined that the knowledge of biology helps one in understanding the world in its natural processes and with the knowledge obtained create a better environment to live in. Hence, biology, in general, provides the knowledge applied in every sphere of life today ranging from food production, environmental protection, conservation of resources, bioengineering and agriculture, prompting its inclusion in the secondary school curriculum in Nigerian secondary schools (Nwuba et al., 2022).

The role of biology in our modern society cannot be overstated, as it functions within a curriculum designed to address societal challenges. However, despite how useful the knowledge of biology is to the society, the achievement of students in the said subject over the years has been unsatisfactory. Over the years, research studies have indicated that academic achievement of students who enroll in biology has not been encouraging (Akande, et al., 2018; Effiong & Igiri, 2015; Joda, 2019; & Olugbuye, 2017). It is disheartening that students' performance in biology in external examinations over the years has remained unsatisfactory and inconsistent as seen in the statistic reports of WAEC from 2015-2019. The percentage pass of students in biology for these years as given in the WAEC Chief Examiner's report for 2015-2019 include: 57.42%, 61.68%, 55.57%, 55.10% and 55.63% respectively. Likewise, Adolphus (2018) discovered that the percentage of biology students finishing secondary schools with credit pass to qualify for University admission is less than 25%. This shows that students' performance in the subject over the years has remained unsatisfactory.

Many researchers like; Nwuba and Osuafor (2021); Sambo (2022); Ufommadu and Okoli, 2019 have attributed this widespread unsatisfactory academic achievement in biology to many factors among which include lack of adequate laboratory facilities and instructional aids, inconducive learning environment, high student-teacher ratio, lack of proper teaching approaches and wide content of secondary school biology curriculum. In order to determine the root cause of students' poor achievement in biology, there is every need to investigate whether the biology curriculum which the students are to cover before their examination is effectively implemented.

Curriculum is one of the central features of education, both in terms of organising education systems and in educational research (Nwoke et al., 2022). Olaitan and Ali (2007) viewed curriculum contents as relating to national and individual goals. Onwuka (2004) defined curriculum as a series of planned and unplanned learning activities which a child is exposed to in the course of his development. It is a written document for managing the education process on a national, school or classroom levels (Nwoke et al., 2022). Therefore a curriculum is an official document that aids in regulating what students are exposed to within and outside their classrooms. The official curriculum, together with supporting materials, such as pedagogical guidelines and guidelines for the use of the different digital tools is viewed as the intended curriculum (Van den Akker et al., 2010). The interpreted and modified intended curriculum according to the needs in each context is the implemented curriculum. While, a hidden curriculum refers to the unspoken or implicit values, behaviours, procedures, and norms that exist in the educational setting communicated to students through words and actions to make them better learners (Alusbaie, 2015).

The process by which curriculum is transformed from the paper into an active exercise is known as curriculum implementation (Salami & Ojediran, 2017). Modupe (2022) suggested Curriculum implementation to mean how the planned or officially designed course of study is translated by the teacher into syllabuses, scheme of works and lessons to be delivered to students. Curriculum implementation involves putting the curriculum into work in order to attain the objectives for which the curriculum was designed (Ajayi, 2008). Omotayo (2007) regarded curriculum implementation as the task of interpreting the curriculum document into the operating curriculum by the collective effort of the students and other concerned. Curriculum implementation involves actualizing the officially recommended courses of study, syllabuses, and subjects (Salami et al., 2019). Modupe (2022) informed that implementation of curriculum takes place when the teacher-constructed syllabus, the teacher personality, the teaching materials and the teaching environment interact with the learner. The procedure involves helping students to gain knowledge or experience as they obtain the arranged or intended experiences, knowledge, skills, ideas and attitudes (Gautam, 2015). Therefore, curriculum implementation takes place when learner acquires the planned or intended experiences, skills, knowledge, ideas and attitudes that are aimed at enabling the same learner to function effectively at the society.

The Nigerian curriculum is student oriented where each subject's learning objectives are broadly stated in terms of students learning outcomes. Biology curriculum is strategized to meet the common requirements of all schools students. The Nigerian Educational Research and Development Council (NERDC, 2008) listed the objectives of secondary school Biology curriculum in Nigeria as follows: Adequate laboratory and field skills in Biology; meaningful and relevant knowledge in Biology; ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture as well as reasonable and functional scientific attitude. As observed by Hamunyela et al. (2022) the key guidelines were intended to provide a student-centered learning environment that meets the needs of individual learners through the use of differentiated instructional strategies, as well as to deliver an outcomes-based curriculum of high pedagogical quality. The curriculum, demands instructional and human resources to ensure that there is a total shift from teacher centered approach characterised by memorization to an inquiry-based teaching approach to develop the student's scientific knowledge and skills. Therefore, the effective implementation of the biology curriculum falls on the biology teacher to equip learners with science skills to meet the 21st century. According to Loflin (2016), the role of the teacher remains instrumental in the success or failure of the curriculum. This implies that teachers should modify their instructional design in order to challenge students' perceptions (Park et al., 2011). Hence, for a teacher to effectively teach biology, he has to be equipped with the appropriate instructional materials to bring home the learning contents to the students for easier understanding and improved achievement.

Instructional materials are those print and non-print items that are designed to impact information to students in the educational process (Bukoye, 2019). According to Effiong and Igiri (2015), instructional materials are print and non-print items in the form of kits, textbooks, magazines, newspapers, pictures or videos, maps, audio-players or graphs, etc. that are intended to facilitate the passing of information to students in the educational process. Instructional materials provide concrete basis for understanding subject contents. Instructional materials can be seen, heard, felt, manipulated, and they serve as a channel through which message, information, ideas and knowledge are disseminated easily. They play a very important role in teaching and learning process, they enhance memory level, retention capacity and recall ability of students; facilitates learning of abstract concepts by helping the students to concretize ideas and stimulate students' imagination (Effiong & Igiri, 2015). Likewise, Kabesa (2019) added that instructional materials assist the teacher and facilitates students' creativity thus making teaching-learning more concrete and interesting, thereby improving academic achievement of the students.

Ezeh et al. (2021) opined that instructional materials for teaching of biology help in making abstract concepts of biology topics and ideas concrete. Ekon et al. (2023) affirmed that biology teachers who adopt appropriate instructional materials in teaching biology will likely be more successful in imparting the knowledge of biology to their students. No wonder Onuh (2022) suggested that for better learning to take place, the learner must be able to lay his/her hands on the environment and manipulate it, at the same time providing access to appropriate learning experience made to enhance ideas, skills and knowledge leading to increased and improved productivity of the learners. Studies have shown that effective use of instructional materials in teaching biology bring about improved achievement in students and by extension, leading to the implementation of the biology curriculum (Buba, 2019; Effiong & Igiri, 2015; Ezeh et al., 2021; Kabesa, 2019). However, Ezeh et al. (2021) observed that the inability of Biology teachers to use instructional materials in teaching bring about ineffective implementation of the biology curriculum. The biology curriculum is student-centered and activity-oriented therefore, biology teachers should provide an enabling environment that allows maximum student-to-student interaction and manipulation instructional materials for learning purposes in order to achieve the desired goals. Like Mkpa (2007) said no matter how sound the curriculum of any subject is planned, designed and documented, if it is not appropriately implemented, the curriculum may not accomplish its goal and objectives. Successful implementation of the curriculum could be realized if the implementer of the curriculum makes use of the appropriate instructional materials to drive home messages the students, given that they aid in active participation and manipulation of the environment, hence the thrust of this study.

Statement of the Problem

In any teaching and learning process, the cardinal objective is to see that the learner should be able to perform tasks and if possible transfer the experience in solving problems in a new situation. The role of biology in national development and wealth creation cannot be overemphasized as it is a very essential science subject and a requirement for advance learning of a number of science related professional courses like medicine, agriculture, pharmacy among others. The knowledge of biology is aimed at preparing students for life in a competitive global economy after school. This objective is hardly been achieved over the years. Despite these importance, students' achievement in the subject in both internal and external examinations over the years has remained unsatisfactory and a matter of concern to educators. This is evidenced in WAEC Chief Examiner's reports 2015-2019. Many researchers today have attributed this unsatisfactory performance of students in biology to several factors of which most emphasis has been placed on the conventional teaching methods that dominates the classrooms, which makes the teaching and learning of the subject uninteresting, and students' achievement in the subject unsatisfactory. However, one may need to look at whether the biology curriculum is effectively implemented by the classroom teachers. Biology notwithstanding its importance seems to be having a problem with the implementation of its curriculum. This is evidenced in the poor performance of candidates in the subject in SSCE. Research has shown that provision and use of instructional materials, use of innovative instructional methods among other things are factors that could affect the implementation of every curriculum including that of Biology curriculum. Assessing this factor has become imperative because it is one thing to design curriculum in an area of study and another thing to implement it effectively. It is against this backdrop that this study is necessitated to investigate effective implementation of biology curriculum in secondary schools in Anambra State.

Research Questions

The following research questions were raised to guide the study:

1. What is the extent of implementation of the biology curriculum in senior secondary schools?
2. What extent to which biology teachers employ instructional materials in the implementation of biology curriculum?

Methodology

Descriptive survey research design was used in the study. The population of the study comprised 3,115 SS2 biology students in public secondary school in Aguata education zone. Simple random sampling was used to draw 200 SS2 biology students from the three local government areas that make up the education zone which include Aguata L. G.A, Orumba North and south L. G. A. Instruments for collection of data were questionnaire, achievement scores in biology, observation and interview. The statistical tools used in analyzing the data were frequency table and simple percentages.

Results and Discussions

Results are presented according to the various research questions.

Research Question 1

What is the extent of implementation of the biology curriculum in senior secondary schools?

The findings of the study revealed that the objectives of the biology curriculum are not fully implemented in secondary schools. Curriculum implementation, in the selected schools was found to be inadequate because 60% of the students have only one biology laboratory and the curriculum implementation as stipulated by WAEC syllabus are not normally carried out. Hence, practical is only conducted one to two times (40%) in a week despite the fact that 62.7% of the students prefer practical than the lecture method of teaching employed by most teachers. Furthermore, it was found that the laboratory equipment are not adequately available in the selected schools (57.3%). That means the students may not have access to laboratory materials like light microscope and other important materials physically which are needed in any Biology laboratory. The number of students per class was much where 80% of the students were found in one class. This obviously will hamper the effectiveness of teaching. It was also noted that 66.7% of the students never consult their school counselor for an advice in their study. Sure, they may be making wrong choices towards their attitude to learning.

Research Question 2

What extent to which biology teachers employ instructional materials in the implementation of biology curriculum?

The result indicated that the extent biology teachers employ instructional materials in the implementation of Biology curriculum is only 40%. This is rather poor as studies by Effiong and Igiri (2015); Ekon (2023); Kabesa (2019) have proven that adequate use of instructional materials in teaching biology brings about improved achievement in biology as well fulfilling the objectives of the curriculum. It was observed that schools did not have the adequate instructional materials needed to effective implement the biology curriculum. They were lacking charts, models, aquarium, potted plants, experimental chemicals, refrigerator, prepared slides, mini zoological garden, computer and projector which is all important for proper understanding of biology. In this modern age, studying is incomplete without the use of computer as they help in driving home abstract contents to the students. Computer Assisted Learning helps immensely in the study of biology, however, it was observed that 76% of students have never use computer. There is need to equip our students with these appropriate tools for learning in order to meet with the digital world.

Conclusion

Findings from this study showed that the biology curriculum is not being effectively implemented in most schools by biology teachers. It could be that period allocated for biology and biology practicals is not efficient to fully implement the curriculum or just laziness on the part of the teachers. It was also found that instructional materials are lacking in teaching biology by the teachers. This should not be so as these materials help to make learning concrete and relevant. Thus, if the biology curriculum is fully implemented, there stands to be improved achievement by students.

Recommendations

The following recommendations were made in line with the results of the study:

- The government/ministry of education should employ more qualified teachers, laboratory assistants, cleaners with the adequate knowledge to handle both the theoretical and practical aspects of biology in an orderly manner to bring about effective implementation of the biology curriculum.
- The periods allocated for practical sessions should be increased and carried out effectively to aid a permanent understanding of biology.
- Biology teachers in public secondary schools in should be sponsored to attend workshops where they will be taught how to improve and upgrade their competency in improvisation and utilization of Biology instructional materials.
- The government should provide fund for schools so as to enable them procure the relevant resources for effective teaching and learning of biology.
- Provision of more favorable environment, the use of instructional materials models, charts, and laboratory equipment by the government.

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