Assessing The Learning Difficulties In The Basic Science In Secondary Schools In Anambra State

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Abstract

The study aimed at assessing the learning difficulties the basic science in secondary schools in Anambra state, causes of the difficulties and way out of the difficulties. Three research questions guided the study and the design of the study was survey design. A total of two hundred and eighty-five (285) junior secondary students selected through stratified and simple random sampling techniques from all the junior secondary schools in Nnewi and Onitsha education zones formed sample of the study. Instrument used for data collection was well structured and validated questionnaire comprising of 20 multiple choice items. Reliability of the instrument was determined using Pearson Product Correlation Coefficient which gave reliability coefficient of.72. Data collected were analysed using mean and standard deviation. Findings of the study revealed that among the learning difficulties students experience in basic science is that they cannot relate class work in basic science with real life and thus cannot apply science principles in a variety of context. Also, findings revealed that teaching method used by the teacher is a contributory factor in students' learning difficulties in basic science. It indicated that teachers' use of students-centred and activity-oriented instructional strategies can help in reducing the learning difficulties. Based on these findings, it was recommended among others, that government should engage the services of experienced and qualified basic science teachers to handle the subject in schools.

Key words: *Assessing, Learning Difficulties, Basic science, Secondary school.*

Introduction

Science is the study or knowledge of the physical and natural world based on observation and experiment. According to Götz, Gosling and Rentfrow (2022), science is an ordered body of knowledge in form of laws, theories and concepts. It is concerned about general explanations of reality (Sjoberg, 2001). However, basic science is rudimentary and elementary science to which children are exposed to develop their interest and also enhance their scientific skills (IG Global, 2024). Basic science comprised of natural sciences such as physics, chemistry, biology, mathematics and earth sciences. It provides a fundamental understanding of natural phenomena and the processes by which natural resources are transformed. Understanding and explanation of the natural phenomena can only be achieved through learning.

Learning is the acquisition of skills and knowledge and having them readily available from memory, so as to apply them in solving real life problems. Learning can also be viewed as the process of acquiring new or modifying existing knowledge, behaviours, skills, values, or preferences. It is change in human disposition or capability that persists over a period of time and is not simply ascribable to processes of growth. Hornby (2015), described learning as knowledge

you get from reading and studying. Also, Mayer (2015), defined learning as a relatively permanent change in a person's knowledge or behaviour due to experience. The three components inherent in Mayer's (2015) definition of learning are that:

1. The duration of the change is long term rather than short term.
2. The locus of the change is the content and structure of knowledge in memory or the behaviour of the learner's, and
3. The cause of the change is the learners experience in the environment rather than fatigue, motivation, drugs, physical conditions or physiologic intervention

Learning involves strengthening correct responses and 'weakening incorrect responses (Ruth, Clark and Mayer, 2016). Learning is measured mostly by the ability of the students to apply the learned concepts and attitudes in solving new problems. This is termed conceptual understanding. According to Eric (2018), conceptual understanding refers to making sense of experiences /ideas by seeing the relationships between concepts and applying them. This implies that concepts, such as concepts in basic sciences, cannot be learned by rote but by thoughtful, reflective learning. The teachers' ability to develop conceptual understanding among students involves seeing the connections between concepts and procedures and being able to apply science principles in a variety of contexts. It is different from passing routine knowledge that is applicable only to certain situations.

However, effective learning of basic science depends largely on the use of necessary facilities and methods. This involves the manipulation of available materials, equipments and tools related to the skills to be learnt in basic science as well as using appropriate methods to teach the subject. The methods for teaching basic science involve lecture, demonstration, practical, project, problem-solving, field trip/excursion, team teaching, tutorial, discussion, computer assisted learning, game/simulation method, among others. Recently, efforts are targeted towards classroom delivery methods that guarantee a shift from teacher-centred to student-centred approach. It is against this background that many innovative strategies were developed to bring about improvement in teaching and learning. Students are made to be involved in doing things and thinking about the things they are doing. Such strategies include the use of advanced organizers, cooperative learning, generative learning, concept mapping, analogies, learning cycle, active learning process, simulation and games. Nevertheless, choice of methods depends on the characteristics of the learners, availability of facilities and skills to be learnt. Hence, the teaching method to adopt should elicit real sense of active participation among the learners.

Moreover, learners often experience some challenges, in form of difficulties in learning some concepts in basic science. These challenges can be hinged on some factors such as preconceived notions, nonscientific beliefs, conceptual misunderstandings, vernacular misconceptions and factual misconceptions. According to Cicerchia (2016), learning difficulties are conditions that impact on an individual's ability to gain knowledge and skills at the same rate as his or her peers. They may be due to mental handicap or cognitive disorder. Learning difficulties can affect people of all ages which may interrupt the development of key literacy skills required for students to excel in all areas of the curriculum. Learning difficulties pose great challenge to the normal skills of a teacher who is not particularly equipped with adequate training to cope with students struggling with learning difficulties. More also, teacher's content knowledge of the subject and language of communication of basic science concepts can as well contribute to learning difficulties in basic science. Basic science teacher's content

knowledge of the subject determines to a large extent the quality of his teaching and his ability to initiate appropriate teaching method for teaching the subject. Nevertheless, many teachers have inadequate subject matter knowledge of some topics in their subject areas which could create a lot of misconceptions or alternative conceptions among their students that could affect their performances (Udoh, 2021). Therefore, teachers should have sound knowledge of the subject matter to enable him/her choose the appropriate teaching methods, techniques and strategies that could enhance learning.

In the same vein, language of communication of basic science concepts via teaching can also contribute to students' difficulties in learning the concepts. Teaching basic science by use of unfamiliar or double-barreled, misleading or strong technical, or high sounding words results in memory space overload arising from extra task on the memory to interpret and understand such words. Therefore, basic science teachers should be cautious of the language and vocabularies they use during basic science instructions so as to enable students understand the concepts being taught.

Hence, understanding learning difficulties and the strategies to addressing them will reduce the challenges faced by the learners in basic science classroom. The problem of this study, therefore, was to assess the learning difficulties in the basic sciences in secondary schools in Anambra state and determine strategies for reducing them.

Statement of the Problem

Science subjects had always been perceived by secondary school students as difficult, boring and tough subjects compared to the art subjects. Some researchers have shown that many concepts in science are perceived as difficult by both teachers and students. Thus, students in secondary school have to contend with many difficulties in learning these science subjects. If these perception is not properly addressed while teaching basic science in the junior. secondary school but ignored, the number of students who are neither interested nor motivated to learn the subject will increase, thus, leading to poor enrolment in science subjects in the senior secondary school. This invariably becomes a source of difficulty for the science teachers in teaching science subjects to the students in senior secondary, since the students did not grasp the rudimentary concepts in science during their basic science instructions. Hence, it becomes imperative to assess learning difficulties students experience in basic science, the causes of these difficulties and how to tackle them.

Purpose of the Study

The main purpose of this study was to assess student's learning difficulties in the basic science in secondary schools in Anambra state. Specifically, the study intended to:

1. Identify the difficulties students encounter in learning basic science.
2. Identify the causes of the difficulties.
3. Determine strategies to reduce the difficulties

Research Questions

The following research questions were posed to guide the study:

1. What are the difficulties encountered by students in learning basic science in secondary schools?
2. What are the causes of the identified learning difficulties?
3. What are the strategies for reducing the identified learning difficulties?

Method

The design of this study was survey design. The population constituted all the junior secondary 3 (JS 3) students in junior secondary schools in Onitsha and Nnewi education zones of Anambra State. The sample was made up of two hundred and eighty-five (285) junior secondary school

year 3 students drawn from schools in the two education zones.

Ten (10) and nine (9) secondary schools respectively were selected from Nnewi and Onitsha education zones using stratified random sampling technique. In each of the schools, fifteen (15) junior secondary 3 (JSS3) students were selected using simple random sampling. Hence, a total of 150 students were randomly selected from sample schools in Nnewi education zone while 135 students were picked from Onitsha education zone, making grand total of 285 students.

A well-structured questionnaire was the main instrument used for data collection.

The questionnaire was made up of two parts: Part A, of the instrument requested for personal data of the respondents in terms of nature of schools, school type, education zone and class of study while Part B, comprising of 20 items, was designed to elicit information from the respondents on their learning difficulties in basic science, likely causes and possible way out of the difficulties.

The validity of the instrument was established by one expert in physics education, two experts in basic science (Integrated science) department and one expert in measurement and evaluation, all from Nwafor Orizu College of Education Nsugbe. The final draft of instrument was trial-tested by administering it to JS3 students from a non-inclusive school. It was re-administered twice at two-weeks interval. A correlation coefficient of 0.72 was obtained as the reliability when the data from trial-test was subjected to Pearson Product Correlation Coefficient Method. The instrument was administered by the researcher using on-the-spot method. The respondents were requested to draw the attention of the researcher if they had any problem in the process of responding to the instrument. The rating scale for the questionnaire was from 1 to 4 in ascending order of importance, and the mean

point scale was computed to be 2.50. The data collected were analysed using mean, standard deviation.

Result

Research Question 1: What are the difficulties encountered by students in learning basic science in secondary schools?

Table 1: Mean rating of students' responses on learning difficulties in basic science.

S/N	Item Students' learning difficulties in Basic Science include	Mean $(\bar{X})$	S.D.
1.	Inability to relate classwork with real life	2.87	0.61
2.	Inability to apply science principles in a variety of contexts	2.96	0.65
3.	Conceptual misunderstanding of some concepts taught	2.89	0.64
4.	Misconceptions and alternative conceptions about some topics in basic science	2.93	0.62
5.	Inability to solve mathematical problems	2.87	0.59
6.	Inability to navigate between different representations such as experiments, formulae and calculations	2.96	0.65
7.	Inability to decode formulae and symbols encountered in basic science	2.88	0.59

Table 1 revealed that items 1-7 are the possible learning difficulties of students in basic science as their mean ratings are above the cut-off mean of 2.50.

Research Question 2: What are the causes of the identified learning difficulties?

Table 2: Mean rating of students' responses on likely causes of learning difficulties.

S/N	Item Likely causes of learning difficulties in basic science	Mean $(\bar{X})$	S.D.
8.	Teaching method used by the teacher make the subject difficult to learn.	2.99	0.67
9.	Teachers not relating concepts taught in basic science to real life applications in solving real life problems.	2.96	0.64
10.	Inadequate use of teaching aids and facilities in teaching	2.54	0.98
11.	Abstract nature of the subject	2.83	0.72
12.	Language of communication used by the teacher	3.05	0.55
13.	Students not motivated or interested in the subject	2.39	1.21
14.	Teachers' poor content knowledge of the subject	2.89	0.62
15.	Poor study-habit among students	3.11	0.60

Table 2 showed that all the items, except item 13 with mean rating of 2.39, are the likely causes of learning difficulties. The table, therefore,

indicates that students are interested in basic science, thus, implying that their interest in the subject does not constitute a learning difficulty in studying the subject.

Research Question 3: What are the strategies for reducing the identified learning difficulties?

Table 3: **Mean rating of students' responses on strategies for reducing learning difficulties in basic science.**

S/N	Item Likely causes of learning difficulties in basic science	Mean ($\bar{X}$)	S.D.
16.	Engaging the services of experienced and qualified basic science (integrated science) teachers in handling the subject in schools	2.92	0.65
17.	Providing concrete experiences in basic science lessons	2.76	0.64
18.	Using student-centred and activity-oriented instructional strategies to facilitate assimilation of learned concept	2.87	0.56
19.	Making facilities/teaching aids for teaching basic science available in schools to facilitate teaching/learning of concepts	2.93	0.63
20.	Making basic science education relevant to the students through the use of real life applications/examples of concepts learnt in the subject	3.10	0.88

Table.3 indicated that application of items 16-20 can help in reducing learning difficulties of students in basic science. This can be observed from their mean ratings which exceeded cut-off mean of 2.50.

Discussion

Table 1 revealed that all the items in the table are the difficulties experienced by students in learning basic science. Hence, students find it difficult to relate classwork with real life and thus, cannot apply science principles in a variety of contexts. They often have misconceptions and alternative conceptions of some topics in basic

science; and thus, cannot construct meaning of concepts taught. Furthermore, inability to decode formulae and symbols encountered in basic science and to solve mathematical problems limit their learning of basic science. Hence, Erinosho (2013), found that students' learning difficulty is associated with the fact that they have to contend with many representations - such as experiments, formulae and calculations, graphs, words, conceptual explanations - at the same time, and they have to make transformations among them.

From table 2, students are interested in basic science. Hence, interest in the subject is not a contributory factor to their learning difficulties in basic science. Other items such as teaching method, inadequate use of real life examples, inadequate use of facilities and teaching aids, abstract nature of some concepts in basic science, language of communication used by the teachers, teachers' poor context knowledge of the subject and poor study habits of students contribute to learning difficulties of students in basic science. This is in line with the findings of Uzoechi and Adejoh (2014) that teachers' inadequate subject matter knowledge of some topics in their subject areas could create a lot of misconceptions or alternative conception among students that could affect their performances in the subject.

In table 3, items 16-20 were rated above cut-off mean as strategies for reducing students' learning difficulties in basic science. Hence, engaging the services of experienced and qualified basic science teachers, providing concrete experiences in basic science lessons, using student-centred and activity-oriented instructional strategies to facilitate assimilation of learned concepts, making facilities/teaching aids for teaching basic science available in schools and making basic science education relevant to the society can reduce the difficulties of students in learning basic science. Thus, Udoh (2011) revealed that teaching and learning has to change from mere acquisition of facts to the complete personal

development and active participation of the individual learner; and that teaching should progress from verbalization level to include operationalization and that the three domains of knowledge, viz.: cognitive, affective and psychomotor must be emphasized in classroom instructions.

Conclusion

From the discussion of findings,

1.   Students encounter varying difficulties in learning basic science in secondary schools which include inability to relate class work with real life, inability to apply science principles in a variety of contexts, among others.

2.   Students' interest in basic science is not a contributory factor to their learning difficulties in the subject since they are interested in studying the subject.

3.   Students' learning difficulties in basic science can be reduced by engaging the services of experienced and qualified basic science teachers, providing concrete experiences in basic science lessons, using student-centred and activity-oriented instructional strategies to facilitate assimilation of learned concepts, among others.

Recommendations

Based on the discussion of the findings, the following recommendations were made:

1.   Government should engage the services of experienced and qualified basic science teachers in handling the subject in schools.

2.   Basic science teachers should adopt the use of student-centred and activity-oriented instructional strategies to facilitate assimilation of learned concept.

3.   Government should provide facilities/teaching aids for teaching basic science in schools.

4.   Basic science teachers should be organizing tutorials/remedial classes for students having glaring difficulties in learning basic science.

5.   Basic science teachers should be using concrete experiences for students during

basic science class lessons and make students understand the relevance of basic science to the society.

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