Upper Basic Students' Perception of Concepts as Correlate of their Academic Achievement in Basic Science in Cross River State, Nigeria

Edu, G.O.^{1,} Edu, D.O² & Sanda, A.E^{.3} Department of Curriculum & Teaching University of Calabar Calabar, Cross River State, Nigeria^{1&3}

Department of Curriculum & Instructional Technology Cross River University of Technoly, Calabar Cross River State, Nigeria² edudave56@yahoo.com^{1&2}, afrodemmy@yahoo.com³

ABSTRACT

This study examined students' perception of concepts and their academic achievement in Basic Science in Cross River State, Nigeria. A sample of 883 Upper Basic Education III students was randomly drawn from thirty six (36) secondary schools in the three education zones of state. A questionnaire and a multiple choice test based on the eight broad concepts in the Upper Basic Science curriculum were used as instrument to obtain relevant data for the study. The data was analyzed using Pearson Product Moment Correlation analysis technique. The result of the analysis showed that students' perception of concepts has a significant relationship with their achievement in the subject. Based on this finding, the researcher concluded that there was an indication that science learning at this level of education has challenges that make it difficult to students. Since this subject is the foundation for all science subjects at other levels of education in Nigeria, poor achievement as a result of perceived difficulty may have led to students' general low achievement in the sciences. It was thus, recommended that measures be taken to make science interesting to students to ease any difficulty and thus, raising their achievement in science and science related subjects.

Keywords: Students, perception, basic science, concepts, academic achievement

Aims Research Journal Reference Format:

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1. INTRODUCTION

Science education is a means by which individuals learn about the nature of science, its principles, concepts and ideas, and makes people aware of the importance of science to the development of a nation. The increasing importance of science for a sustainable society has prompted the Nigerian government to emphasize the teaching/learning of science in schools at all levels (Aweh, 2004). The Nigerian government has further recognized the fact that education is the only instrument that can be used for effective national development and the school is the major agency for transmitting learning for a sustainable society (FRN, 2004; & Ojogan & Oganwu, 2006). Thus, the Basic Science curriculum is one of the curricula materials for sensitizing students of the Upper Basic level of education on science concepts there by arousing their interest in the field of science (FRC, 2004).

According to Iwuamadi (2008), the Universal Basic Education (UBE) classes are the bottom-line education upon which every other educational programme is built. Thus, Basic Science serves as the foundation for the study of science at all other levels of education in Nigeria. At the Upper Basic Level of education, Basic Science is meant to integrate the students into the world of science after they have been exposed to the rudiments of primary science at the lower and middle Basic Education (Umezuirike, 2008).



In reaction to students' difficulties and misconceptions in science, the Missouri Department of Elementary and Secondary Education (2005) alerts that some students will fail to learn ideas because the subject matter material may be at a level that does not match the developmental learning stage of the students or the instruction. The report further asserts that curriculum instruction and assessment are significantly improved when teachers are aware of the developmental considerations and the research findings on commonly held alternative conceptions.

Boo (1998) emphasized that students have a difficult time understanding the abstract concept of energy, and urged that more emphasis be given to the concept of the driving force involving the concept of free energy/entropy. Boo further observed that the same emphasis should be given to the difficulty students have in bridging the gap between perceptual thinking and the use of concepts about particles and their interaction. The author observes that students failed to understand the nature of sciences as a process of construction of predictive conceptual models and the nature of scientific concepts and principles. This is an indication of students' difficulty in the sciences.

Stephens (1994) wondered why our students are not learning, if we are teaching. In a bid to answer this question the author researched and examined curriculum materials and observed students and teachers and came up with the following reasons for students' confusion and misunderstanding: Students' ideas do not always evolve as quickly as the rate of concepts presentation in most textbooks and in many teacher-designed units of instruction; language used by teachers and textbooks may confuse some students; there is often unexplained conflict between students' everyday experiences and classroom or textbook presentations; and immediate introduction of scientific definition and formulas (many of which are abstract) are not necessarily convincing or meaningful to students if they have not had sufficient experience with the idea first. The author further opines that traditionally, many students engage in activities after presentation and discussion about the concept. These activities tend to be verification rather than inquiry-based where students construct an understanding based on observations and evidence they gather.

Over the years, literature has shown some researches in the area of perception of difficulty of concepts in the sciences. Akpan (1985) examined perceived difficulty of concepts in Chemistry by secondary school students in Sokoto Education Zone using WAEC traditional Chemistry syllabus centred on 17 concepts. The investigator used two hundred and fifty (250) subjects, who responded very difficult, difficult, moderately difficult, not difficult or not taught. The data was analyzed using frequencies and percentages of the degree of difficulty of Chemistry topics. The findings showed that electricity (61.6%), solubility (41.6%) orbital theory and atomic bonding (38.4%), metals and their compounds (38.8%) were very difficult. Onwu (1985) in a research finding indicated that students perceived the following concepts as difficult in Chemistry: ion, electron, equation, the mole, methods of preparing salts and ionic solutions.

Osisioma (1994) investigated students' difficulty of concepts in Biology. The instrument for data collection was a questionnaire which consisted of topics in the senior secondary Biology curriculum and a three point Likert type rating scale on which students indicated the degree of difficulty they associated with each topic. The sample consisted of 500 senior secondary III students drawn from former Nnewi Education Zone in Anambra State. The data was analyzed using the simple percentage and ranked in order of difficulty from the most difficult to the least difficult. The result showed that students found ecology, genetics kreb's cycle, glocolysis and evolution ranking highest in the list of difficult concepts.

Inyang (1994) examined senior secondary school students' and teachers' perception of difficult concepts in Chemistry and found out that both teachers and students have perceived Chemistry concepts' difficulty in S.S.C.E. The Chemistry syllabus was analyzed to spot out newly introduced topics, then three senior school Chemistry textbooks were analyzed to determine the Chemistry topics that were absent or not properly treated. The various analyses showed that some of the topics that were found difficult were not properly treated in the textbooks. The investigator also discovered that difficulty of topics in science may be as a result of lack of laboratory facilities for their effective teaching, hence, teachers presented them poorly.

Onwoduokit (1996) also examined the level of difficulty of senior secondary Physics students in Physics curriculum in Akwa Ibom State. Subjects were required to state how each concept was difficult. The findings revealed that most Physics concepts (77.42%) were reported as either averagely difficult or very difficult by both teachers and students. Also, Nneji (1998) examined students, teachers and examiners perception of difficult topic in applied electricity. A questionnaire, asking 39 students and 4 teachers to rank on a five scale point, their difficulty level was used for the study. Out of 21 topics listed, only 9 were not perceived as difficult by all the groups, showing that 67% of the topics were perceived as difficult by teachers and students. However, the sample for the study seemed to be too small for the result to be effectively generalized.

Agogo & Onda (2014) conducted a research on the identification of students' perceived difficult concepts in Senior Secondary school Chemistry in Oju Local Government Area of Benue State, Nigeria with the help of a questionnaire administered to 830 final year students in science class and 52 physics teachers purposively drawn from secondary schools in Ogun and Lagos States, Nigeria. The findings showed three major sources of difficulty in learning physics as related: nature of subject, teaching/teacher factors and curriculum/assessment. Students were found to have difficulty understanding specific topics in the curriculum that are usually characterized as lacking concrete examples and requiring a lot of mathematical manipulations or visualization.

All these reviewed studies gave indication of a very weak foundation as far as science learning is concerned in Nigeria. It is therefore necessary to undertake this study on the relationship between students' perception of concepts in Basic Science and their academic achievement in the subject in Cross River State, Nigeria.

1.1 Statement of the Problem

The future of any nation in this 21st century depends almost wholly on scientific and technological development (Fafunwa, 1990). Hence, a nation that wants progress must lay emphasis on a sound scientific background for its citizens, especially at the foundational level of education. This would create room for sustainability of scientific interest among the citizens of the nation. As observed by Porter (1991), the teaching of science may be very expensive but the rewards or penalties for doing it well or badly can be breath-taking.

Thus, the Nigeria government has directed much effort in providing science equipment and materials in schools, preparing personnel for science and emphasizing the sciences in teacher education. However, there has been consistent decline in the academic achievement of students in public examinations in sciences across the country over the years (Agogo, 2003; Samba & Eriba, 2012). Many reasons were suggested as being responsible for this poor academic achievement. According to Samba and Eriba (2012), it is due to the abstract nature of science concepts, while Mailumo, Agogo and Kpagh (2007) blamed it on student and teacher related factors. Also, Agogo (2003) and Agwi (2008) opined that the low achievement in the science and science related subjects is as a result of concepts difficulty. The question is, could the perception of concepts in the Basic Science, which is the foundation for science learning, be a contributory reason for continuous mass failures in the subject?

1.2 Hypothesis

There is no significant relationship between students' perception of difficult concepts and their achievement in Integrated Science.

2. METHODOLOGY

The researchers formulated one hypothesis to guide the study. The study was restricted to Upper Basic School III students and Basic Science teachers in Cross River State. The choice of the Upper Basic School III students is predicated on the assumption that they have been exposed to the Basic Science curriculum for at least two academic years, which may have covered about 66.7% of the entire Basic Science curriculum. Multiple choice item achievement test in conjunction with a questionnaire on perception of difficult topics in Basic Science were used to obtain data for this study. Data obtained were analysed using the Pearson Product Moment Correlation analysis technique. The results were presented in tables.

3. ANALYSIS OF DATA AND RESULTS

There is no significant relationship between students' perception of difficult concepts and their achievement in Integrated Science. Using the Pearson product Moment Correlation Analysis, this hypothesis was tested at 0.05 significant level. The result of the analysis is presented in Table 1.

TABLE 1

Pearson product correlation analysis of relationship between students' perception of difficult concepts and their achievement in integrated science

		(n= 883)	
Variable	<u>X</u>	SD	r
	120.12		
Perception of Difficulty (x)		9.83	
	18.61		086*
Achievement in Integrated Science			
(y)		5.76	
*Significant at .05; df = 881; critical r .055			

The result in Table 1 showed that there is a significant negative relationship between students' perception of difficult concepts and their achievement in Basic Science (r = -.086; p < .05). The null hypothesis was rejected because the calculated r-value of -.086 was found to be higher than the critical r-value of .055 at .05 alpha level and with 881 degrees of freedom. The negative r-value obtained implies that the higher the students' perception of difficulty of the concept, the lower their achievement in Basic Science tends to be. On the other hand, the lower the students' perception of difficulty of the concept, the higher their achievement in the subject tends to be.

4. DISCUSSION OF FINDINGS

Students' perception of difficult concepts and their academic achievement in the subject

The result of the study revealed that there was a significant relationship between students' perception of difficult concepts and their achievement in the subject. The result indicated that the higher students' perceived difficulty in the Basic Science Achievement Test, the lower their achievement and the lower their perceived difficulty, the higher their achievement. This result is in line with that of Agogo & Onda (2014) who conducted a research on the identification of students' perceived difficult concepts in Senior Secondary school Chemistry in Oju Local Government Area of Benue State, Nigeria and found out that the three major sources of difficulty in learning physics are related. These are, nature of subject, teaching/teacher factors and curriculum/assessment. Students were found to have difficulty understanding specific topics in the curriculum that are usually characterized as lacking concrete examples and requiring a lot of mathematical manipulations or visualization. This goes to confirm the relationship between perception of concepts and achievement of students.

This perception of difficulty of Basic Science concepts could be seriously determined by the standard of the teacher in terms of classroom instruction and administrative activities as observed by Nwagwu (1988). As maintained by Umeoduogu (1998), sometimes, concepts in science become difficult to communicate especially when the teacher is not fully conversant with them. Thus the result obtained from the analysis of this hypothesis was indicative of the fact that the persistent failures in the sciences may be a function of the difficulty which students perceive in Basic Science, which is the foundation for science learning, occasioned by ineffective teaching.

5. CONCLUSION

The findings arising from the study indicated a relationship between students' perception of concepts and their performance in the subject. Thus, the researchers concluded that there is an indication that Basic Science learning has not been effective at the Upper Basic level of education in Nigeria. Since this subject is the foundation for all the science subjects at the senior secondary school level of education, its ineffective learning at this level, may have led to students' poor performances in the subject, especially at external examinations. There is therefore a need for change in the approaches to the teaching of Basic Science. The methods used for teaching science should be tilted towards helping students to overcome difficulty in the subject.

6. RECOMMENDATIONS

- 1. Educational planners should locate pitfalls in Basic Science programme, as indicated in the findings of this study and plan possible remedial programmes for students to clear perceived difficulty.
- 2. Teachers should be assisted to use materials such as text, overhead transparencies to diagnostically and strategically tackle Basic Science concepts to students.
- 3. Students should be encouraged to improve their achievement in Basic Science by involving them in various activities such as excursions, laboratory exercises, practice exercises, students' centred lessons and playing of games to ease their difficulty of concepts in the subject.
- 4. Since the perception of concepts may likely depend on the way science may have been taught, conferences and workshops should be organized for Basic Science teachers and made compulsory for all.
- 5. The methods used for teaching science should be tilted towards making science practical to the students for a more effective understanding of the concepts.

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