

Attitude and Experience as Influencing Variables of Teachers' Perception of Difficult Concepts in Primary Science in Ikom Educational Zone, Cross River State, Nigeria: The Need for Curriculum Review

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Abstract: This study investigated primary school teachers' attitude and teaching experience as some of the variables influencing teachers' perception of difficult concepts in Primary Science in Ikom Educational Zone of Cross River State. Three null hypotheses were formulated on the basis of the identified independent variables of attitude and years of teaching experience. The teacher variables and perception of difficult concepts in Primary Science Inventory (TVPDCPSI) was developed and used in gathering data from 482 primary school teachers in 33(out of 330) primary schools in the study area as sample, using cluster and random sampling procedures and the ex-post facto design. Generated data were analyzed using population t-test, independent t-test and one way analysis of variance (ANOVA) at .05 alpha levels. It was revealed that teachers found some concepts/topics in the primary science curriculum difficult; and that their attitude and experience/years of service significantly influence their perception of this difficulty. It was concluded that teachers who cultivate negative attitude towards Primary Science, as well as those with less than five (5) years of teaching experience significantly find the teaching of the subject/concepts more difficulty than those who cultivate positive attitude. Recommendations were that compulsory teaching of Primary Science by all primary school teachers should be discouraged, while teachers should be motivated by in-service training for specialization in such specific school subjects, among others.

Keywords: Attitude; experience; teachers' perception; difficult-concepts and teaching of science concepts

1. Introduction

In recent times, every society is experiencing a transformation that is socio-economic, cultural, political, scientific and technological in nature (Federal Republic of Nigeria (F.R.N), 2004). According to Owo (1990), the development of Science and Technology had a practical application and it was largely responsible for transforming the erstwhile societies of the western world into advanced societies. Nigeria as a country has recognized the importance of Science and Technology in the development of the nation. This, according to (Nwahunanya, 2006) explains the Federal Government's directive that admission of students into institutions of higher learning should be in the proportion of sixty percent (60%) for Science and forty percent (40%) for non-science courses. Furthermore, in order to revolutionize her people and the economy to meet up with these scientific

and technological changes, Nigeria has emphasized the teaching of science, mathematics and technology in our schools at all levels (Aweh, 2004).

The various subject curricula are the means by which schools endeavour to realize the hopes and aspirations of the society. It therefore follows that Primary Science is one of such curricula materials aimed at sensitizing the primary pupils on scientific concepts and consequently, rousing their interest in the field of Science and Technology (F.R.N., 2004).

Formal education commences at the primary level, a level of education that occupies a central position in the developmental process of every nation. According to the National Policy on Education (F.R.N, 2004), all other educational systems (the secondary, tertiary among others) are built upon the elementary education level, hence, the primary level remains the key to the success or failure of the whole system. This means that the quality of the Nigerian system of education is determined by the quality of her primary education.

The process of Science and Technology, which is indicated not only by the accumulation of facts, but by the emergence of scientific methods and scientific attitude in our youth in primary, secondary and tertiary levels of education, places on the school and the teachers (who are the molders of the individuals) a great responsibility, which is instilling scientific attitude in the students. The role of the teacher in the acquisition of scientific methods and attitudes is overwhelming. Corroborating the above fact, Ibe (2008) observed that meaningful learning, involves relatively new ideas or concepts in the learner's cognitive structure. Furthermore, he observed that the attitude of the teachers to the teaching of science is one of those factors that are adjudged to make up the best five linear predictors of achievement in science. A teacher is regarded as the protagonist as well as the catalyst in the teaching/learning arena (Denga, 1991) and the greatness of a nation may to a large extent be attributed to the quality of the teachers in the educational system. Aweh (2004) opined that a teacher serves as the most important science curriculum implementer. This is confirmed in the Federal Republic of Nigeria (F.R.N., 2004), which added that no educational system can rise above the quality of its teachers, hence teacher education will continue to be given priority in all Nigeria's educational planning (F.R.N, 2004). However, even with the tremendous emphasis placed on the teaching and learning of Science, the subject has continued to suffer setbacks. Teachers have shown marked difficulty in coping with the teaching and learning of Science and Mathematics (Njoku, 2003; and Martins-Omole, 2002). Martins-Omole (2002) also found out that teachers show the same range of misconceptions in Science as has been found in students despite their tendencies to cover-up with sophisticated language and topic skipping.

This tends to suggest that science education in Nigeria is unsatisfactory (Okereke, 2006). Eggen and Kauchak (2002) found out in a study, possible reasons for teachers difficulty in identified content areas of Agricultural Science syllabus as lack of relevant instructional materials, the subject's wide coverage, lack of suitable textbooks, shortage of professionally qualified teachers, too much work load, students' lack of interest, lack of laboratories, lack of teaching aids, most of the areas cannot be explained with local examples and refresher courses/workshops/in-service programmes not organized for teachers to educate them.

The lack of understanding of the underlying concepts and fundamental ideas on the part of teachers may, to some extent, be responsible for the mass failure of students in Science subjects. Researchers have been conducted to find out if the lack of understanding of the underlying science concepts is a result of perception of difficulty of scientific concepts (Martins-Omole, 2002; Aweh, 2004 and Njoku, 2005).

The question to ask is: Could these teachers' perceived difficulties in the teaching of Science be attributed to their personal variables such as their attitude to Science and years of teaching experience?

This study therefore became necessary to explore the extent to which these variables of attitude and years of teaching experience influence teachers' perception of difficult concepts in Primary Science. Specifically, the study sought to determine: (i) the Primary Science topics, which teachers perceive as being difficult; (ii) If teachers' attitudes have any influence on their perception of difficult concepts/topics in Primary Science; and (iii) whether years of teaching experience affects teachers' perception of such difficult concepts in the Primary Science curriculum.

On the basis of the above, the following null hypotheses were formulated to give focus to the study:

- Ho₁: Primary school teachers do not perceive concepts in Integrated Science as significantly difficult.
- Ho₂: Teachers who cultivate positive attitude do not differ significantly from those who cultivate negative attitude in their perception of difficult concepts in Primary Science.
- Ho₃: There is no significant influence of years of teaching experience on teachers' perception of difficult concepts in Primary Science in Ikom Educational Zone.

2. Methodology

The ex post facto design was adopted for this study, since it aimed at investigating cause and effect relationships. Also in this design the researchers did not have any direct control of the independent variables as their manifestations had already occurred among the subjects (teachers) and inferences were made without direct intervention from concomitant variation of independent and dependent variable (Kerlinger, 1986).

2.1 Population and Sample

The available population of the study was 5,200 teachers (males and females) in 330 public primary schools in the Ikom Educational Zone. Of these, only 10% of both schools and teachers were used for the study (that is 33 schools and 520 teachers). However, 482 teachers actually responded to the instrument and were used for analysis. The schools and teachers were randomly selected proportionately with 4 schools and 63 teachers from Abi Local Government Area (L.G.A); 9 schools and 110 teachers from Boki L.G.A; 3 schools and 48 teachers from Etung L.G.A; 6 schools and 93 from Ikom L.G.A; 7 schools and 95 teachers from Obubra L.G.A; 4 schools and 72 teachers from Yakurr L.G.A, respectively. All these added together to form the sample of the study.

2.1.1 Instrumentation

A questionnaire (Teacher Variables and Perception of Difficult Topics in Primary Science Inventory (TVPDTPSI) was used in generating data from 482 primary science teachers from 33 primary schools in the area of study using the stratified cluster and simple random sampling procedure. The questionnaire consisted of 74 items, designed on two sub-sections A and B (12 items measuring attitude and 62 items measuring perception of difficult concepts in the subject). Items on attitude were designed on 4-point likert-type scale of Strongly Agree, Agree, Disagree, and Strongly Disagree while section B was designed to measure the extent to which the respondents perceived items (topics derived from Primary Science curriculum) having four (4) structured responses for each items viz: Very Difficulty; Difficult; Fairly Difficult and Easy.

3. Data Analysis and Discussion

3.1 Hypothesis One

Primary school teachers do not perceive concepts in Integrated Science as significantly difficult. This is a one variable hypothesis (teachers' perceived difficulty of Integrated Science concepts).

The data was analyzed using the population t-test. The results obtained are presented in Table 1. The result in Table 1 showed that teachers perceived 21 concepts/topics in Primary Science significantly difficult. These topics are: Acid and bases; Soap making; Feeding and habits of domestic animals; Organs of breathing and their functions; Components of blood, blood vessels, circulation and importance of blood; Weather factors and instrument; Eclipse; Levers; Male and female reproductive organs; Heat, temperature, thermometer, units and symbols of temperature scale; The human heart; Simple machines and their common uses; Naturally occurring drugs, synthetic drugs, normal and excessive use of drugs; Weather symbols and records; Changes in Nature; Pulley; Harmful substances, effect and avoidance; Ornamental and historical objects in parks and museums; Magnet; Friction; and Water Projects in Nigeria. All of the calculated t-values obtained for the 21 concepts/topics were higher than the critical t-value of 1.96. Thus, the null hypothesis was retained for these concepts/topics. This means that primary school teachers perceived the above mentioned concepts/topics significantly difficult to teach.

Table 1. A hierarchy of difficult concepts in primary science from least difficult to most difficult

S/N	Variable	Expected mean	Observed Mean	Std. Deviation	t
1	Acid and bases	2.5	2.8083	.9761	6.921*
2	Soap making	2.5	2.9149	.9022	10.097*
3	Feeding and habits of domestic animals	2.5	2.9066	.8637	10.337*
4	Organs of breathing and their functions	2.5	2.9522	.8887	11.173*
5	Components of blood, blood vessels, circulation and importance of blood	2.5	2.9710	.8907	11.608*
6	Weather factors and instrument	2.5	2.9978	.9221	11.855*
7	Eclipse	2.5	3.1390	.8526	13.454*
8	Levers	2.5	3.1452	.7842	14.063*
9	Male and female reproductive organs	2.5	3.0892	.9041	14.308*
10	Heat, temperature, thermometer, units and symbols of temperature scale	2.5	3.0788	.8220	15.460*
11	The human heart	2.5	3.1100	.7913	16.923*
12	Simple machines and their common uses	2.5	3.1598	.8367	17.312*
13	Naturally occurring drugs, synthetic drugs, normal and excessive use of drugs	2.5	3.1328	.79443	17.489*
14	Weather symbols and records	2.5	3.1763	.8105	18.320*
15	Changes in Nature	2.5	3.1266	.7454	18.543*
16	Pulley	2.5	3.1867	.7860	19.180*
17	Harmful substances, effect and avoidance	2.5	3.1888	.7816	19.348*
18	Ornamental and historical objects in parks and museums	2.5	3.1515	.6914	20.686*
19	Magnet	2.5	3.1867	.7144	21.116*
20	Friction	2.5	3.1784	.6985	21.325*
21	Water Projects in Nigeria	2.5	3.3127	.7195	21.778*

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3.2 Hypothesis Two

Teachers who cultivate positive attitude do not differ significantly from others who cultivate negative attitude in their perception of difficult concepts in Primary Science. The dependent variable in this hypothesis was teachers' perception of difficult concepts in the subject, while the independent variable was attitude of the teachers towards Primary Science. In testing this hypothesis, data for the two variables were extracted from the data bank and summarized into their means (\bar{x}) and Standard Deviation (SD). The summarized data was then analyzed using independent t-test statistical procedure as presented in Table 2.

Table 2. Independent t-test analysis of perception of difficult Primary Science curriculum concepts by teachers with positive and negative attitude N = 482

Variable (Teachers' attitude)	N	X	SD	df	t-val	Sign.
With Negative attitude	308	29.41	3.94			
With positive attitude	174	25.92	5.62	480	7.247*	.000
Total	482	27.67	9.58			

The results in Table 2 showed significance for both t-test statistics analysis. From Table 2, the calculated t-value of 7.24* was found to be far higher than the critical t-value of 1.96 needed for significance at .05 probability level with 480 degrees of freedom. With this result, the null hypothesis was rejected. This means that primary school teachers who are positive in attitude differ significantly from those who have negative toward Primary Science in their perception of difficult concepts in the curriculum. Those who were negative in attitude and perceived difficulty in these concepts were more in the study area, and recorded higher mean scores than their counterparts who were positive in attitude and perceived the difficult concepts positively, though with lower mean scores (ie. $\bar{x}_{ve} = 29.41$, $SD = 3.94$; $\bar{x} = 25.92$, $SD = 5.62$; $t_{cal} = 7.24$, $p = .05$).

3.3 Hypothesis Three

Primary school teachers' teaching experiences do not significantly influence their perception of difficult concepts in Primary Science. The dependent variable in this hypothesis was teachers' perception of difficult concepts in Primary Science, while the independent variable was years of teaching experience (categorized into four 1-5 years; 6-10years; 11-15 years; and 16 and above years respectively). Data for each of these groups were extracted from the data bank, summarized into their means (\bar{x}) and standard deviation (SD) and then subjected to descriptive statistics and One Way Analysis of Variance (ANOVA). The result of the analysis is presented in Table 3.

Table 3. Descriptive Statistics and One way analysis of variance (ANOVA) of influence of years of experience on teachers' perception of difficult concepts in Primary Science curriculums

Years of teaching experience	N	X	SD		
1.5	88	136.53	11.31		
6-10	197	138.01	16.93		
11-15	107	142.30	18.57		
16 and above	90	137.12	13.12		
Total	482	138.52	15.88		
Source of variance	Sum of square	Df	Mean square	F-value	Sign.
Between Groups	2851.463	3	950.488		
Within Groups	119184.980	478	249.341	3.12 *	.003
Total	12206.443	481			

- $P < .05$; critical $r = 2.62$; $df = 3, 478$

In a similar manner, from Table 3, the calculated F-ratio of 3.12* was found to be greater than the critical F-ratio of 2.62, needed for significance at .05 alpha level with 3 and 478 degrees of freedom. With this result, the null hypothesis was rejected. This means that Primary school teachers' teaching experience does not significantly influence their perception of difficult concepts in Primary Science. Given the significant F-values obtained, Fishers' LSD Multiple Comparison test was used to determine exactly which group of respondents differed significantly from the others in terms of their assessment of difficulty of concepts/topics in the Primary Science curriculum. The result of the analysis is presented in Table 4.

Table 4. Fishers' LSD multiple comparison analysis of influence of years of experience on teachers' perception of difficult topics

Years of experience	1-5 years (n = 88)	6-10years (n = 197)	11-15years (n =107)	16 and above
1-5	136.53 ^a	-1.47 ^b	-5.77	-.59
6-10	-0.73	138.01	-4.29	.88
11-15	-2.54*	2.26*	142.30	5.18
16 and above	0.44	0.44	2.29*	137.12
MSW = 249.34				

*Group means are along the principal diagonals

* Differences between group means are above the principal diagonals

* Fishers' LSD t-values are below the principal diagonal

* $p < .05$; critical $f = 2.62$

The result in Table 4 showed that the difference in mean perception of difficult topics in Primary Science is significantly higher between respondents with 11-15 and 1-5 years of experience ($t = 2.54$; $p < .05$), those with 11-15 and 6-10 years of teaching experience ($t = 2.26$; $p < .05$), and those with 16 and above and 11-15 years of experience ($t = 2.29$; $p < .05$). On the other hand, the difference in respondents' perception of difficult topics in primary science was not significant between 6-10 and 1-5 ($t = -0.73$; $p < .05$), 16 and above and 1-5 ($t = 0.44$; $p < .05$). The findings showed that respondents with 11-15 years of experience differed significantly from those with 1-5,

6-10 and 16 and above in the perception of difficulty topics, while respondents with 6-10 and 1-5, 16 and above do not differ significantly in the perception of difficult topics in Primary Science curriculum.

4. Discussion

The result of the analysis for hypothesis two showed that significant difference exists between perception of difficult topics in Primary Science curriculum by teachers who are positive and others who are negative in their attitude towards the subject. Of relevance to this study is the opinion of Ma (1999) that attitudes are relatively enduring orientations that individuals develop towards the various objects and issues encountered in life. The result may be attributed to the fact that attitude influences ones perceptual cognition. According to the Cognitive dissonance theory, every individual is motivated to escape any uncomfortable situation and they do this by putting up an attitude that will be consistent with the unpleasant state. This helps to ease up the discomfort associated with the state.

However, the results of the analysis of hypothesis three showed that teachers with years of experience between 11 and 15 years have more perceived difficulty. This corroborates Wokocha's (2002) opinion that the complex nature of Integrated Science teaching in primary and Junior Secondary School classes requires that very competent professionals should guide the learning activities at these levels. The author further observes that the curricular at these levels are academic, vocational and comprehensive and so teachers with sufficient exposure and training in both content and pedagogy are required. This is an indication that teachers' demographic variables are important to effective teaching of Integrated Science.

On teachers' license renewal, Esu and Ntukidem (1997) posited that expired certificates should no longer be accepted for teaching purpose just because teachers' occupational requirements are very dynamic. They affirmed that most qualified and practicing teachers need to up-date their knowledge very regularly through compulsory in-service training programmes.

As observed by the above cited assertions, the perceived difficulty felt among teachers with 11-15 years of teaching experience may be attributed to the fact that, the teachers who have long years of experience may have become obsolete and may have lost touch with new innovations and new introductions in the Science curriculum. At this level, probably the satisfaction and pride that they have come a long way in experience may have caused them to relax, without actually seeking to know more than they do. On the other hand, teachers with fewer years of experience who may be regarded as young graduates from their various training programmes may have been prepared in the use of current innovations in the teaching of concepts in Primary Science.

5. Conclusion

Based on the statistical/empirical findings, it was concluded that attitude and years of teaching experience significantly influence teachers' perception of difficult concepts in the primary science curriculum. Specifically, teachers who cultivate negative attitude and particularly with less than 6-10 years of teaching experience perceive the difficulty of concepts more than others who cultivate positive attitude and have above 10 years of teaching experience.

6. Recommendations

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

1. Since teachers have significant difficulty in teaching twenty two concepts in Primary Science, government should organize seminars and workshops to redress the issue of difficulties of these areas. The compulsory teaching of Primary Science by all primary school teachers should be redressed. Some teachers with aptitude in the sciences should be trained specifically for the teaching of science in the primary school.
2. Since the findings also showed that teachers with long years of experience tend to have more perceived difficulty than others, the government should organize refresher courses for serving teachers to address the issue of science concepts difficulty at the primary level of education. These refresher courses could be made compulsory for all especially for those with long years of experience. This is to introduce teachers to new trends in Science. The results obtained from these refresher courses could serve as teachers' license renewal.
3. Since variability exists in the attitude of teachers towards Primary Science with their perception of difficult topics in the subject, educational planners should explore factors that influence attitude of teachers, formulate and implement policies that would enhance and stimulate positive attitude towards the subject.

Acknowledgement

The study by Leinhardt (1992) who reported an overall negative relationship between teaching effectiveness and teaching experience and observed however, that there was an initial effectiveness on the part of the teacher during the first 5 years, a leveling out period and then a period of gradual decline.

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