INFLUENCE OF TEACHING EXPERIENCE AND SCHOOL LOCATION ON BIOLOGY TEACHERS' RATINGS OF THE DIFFICULTY LEVELS OF NUTRITION CONCEPTS IN ILORIN, NIGERIA

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Abstract

This study reports on the influence of teaching experience and school location teachers on Biology teachers' rating of difficulty levels of Nutrition concepts in Ilorin, Nigeria. The study compared the ratings of experienced and less- experienced teachers, and also those of teachers whose schools were located in the urban and rural areas. A researcher-designed teacher's questionnaire was administered to one hundred and forty eight (148) teachers selected from Ilorin metropolis. The teachers rated the level of difficulty of nutrition concepts as very difficult, moderately difficult or easy. The participating teachers also gave reasons for their ratings. The data obtained were analyzed using weighted means, to rank- order the level of difficulty of all the thirty-three (33) nutrition concepts in the senior secondary school Biology syllabus. Reasons for the level of difficulty of each item were derived from simple frequency count of the responses of the teachers. Chi-square (X^2) test at 0.05 alpha level of significance was used to compare the ratings of the teachers. Findings of the study revealed that some Biology teachers rated nutrition concepts as difficult as (20.90% rating moderately difficult and 28.40% rating very difficult) while the remaining (50.70%) Biology teachers disagreed that nutrition concepts were not difficult to teach. No significant difference was found in the ratings of teachers in the rural and urban schools, but there was significant difference between the ratings of the less-experienced and the experienced Biology teachers on the difficulty levels of the nutrition concepts. The reasons given for the difficulty include abstractness (48.40%), complexity (27.30%), insufficient teaching experience (12.10%), lack of teaching aids (9.10%) and sophistication (3.10%.). In the light of the findings of this study, it is recommended that experienced teachers should be made to handle the identified difficult concepts of nutrition in Biology. Also, a more practical approach should be used in the teaching of the concepts, in addition to Government's sponsorship of Biology teachers to seminars, workshops and conferences to improve their subject - matter knowledge and teaching skills.

Introduction

There have been tremendous efforts made by both the federal and state Governments to improve science and technology in Nigeria after the 1969 curriculum conference on education. These efforts included the establishment of federal and state Technical Colleges, Federal Colleges of Education (Technical), and Federal Universities of Technology, Science and Technology Research Institutes. Many states have also established Science and Technical Schools Board (Okebukola, 2005). The broad goal of secondary school education in Nigeria, as stated in the National Policy on Education (FRN, 2004), is to prepare an individual for useful living in the society and for higher education. One of the objectives of establishing secondary school education is to equip students to live effectively in the modern age of science and technology.

Biology is one of the basic science subjects offered at the senior secondary schools. Biology has been defined by Kimball (2000), as the study of living things. Sarojini (2001) defined Biology as the science of physical life of animals and plants. Biology occupies a central position in the science world, being a gateway to professions like medicine, pharmacy, dentistry, agriculture and a host of others (Maduabum and Iwuala, 1985). Therefore, Biology is seen as one of the core subjects in the Nigerian secondary school curriculum. Biology education is beneficial to human beings in many ways. These ways include promoting understanding of the relationships between humans and their environment, preparing the individual for choice of career and stimulating interest in Biology- based hobbies, etc.

Because of its numerous importance, Biology is the most popular choice, among science subjects nation wide, offered by candidates sitting for the Senior Secondary School Certificate Examinations (SSSCE) (WAEC 2009). Despite the popularity of Biology, results of research studies always reveal the poor performance of students in the subject. (Soyibo, 1983; and 1987); Abimbola and Baba, 1996; Abimbola, 1998; WAEC Research Report, 2008; WAEC Research Report, 2009).

Table 1: **Enrolment Figures and Pass Rates of the Three Basic Science Subjects in SSSCE "O" level Examinations 2005 - 2009**

YEAR	BIOLOGY	PASS RATE (%)	CHEMISTRY	PASS RATE (%)	PHYSICS	PASS RATE (%)
2005	1,051,557	35.74	349,936	50.94	344,411	41.50
2006	1,082,556	35.61	352,452	50.95	345,225	43.84
2007	1,072,607	33.57	432,230	45.96	427,398	58.05
2008	1,285,048	33.94	428,513	44.44	424,893	48.26
2009	1,903552	33.87	442,091	45.97	429,174	43.56

Source:-WAEC office, Ilorin, Kwara state, Nigeria.

The enrolment of the three basic science subjects shows Biology having the highest enrolment. Between 2005 – 2009, Biology enrolment is more than one million candidates annually whereas; Chemistry and Physics have less than five hundred thousand candidates. This shows how popular Biology is among the sciences, but the results of Biology however, throughout the years sampled was the poorest. The percentage pass at credit and distinction in Biology was between 33.57%-35.74%, Physics had 41.50%-58.05% while Chemistry has 44.44%-50.95%.

Nutrition, which is the content area of this study, is the first part of the Biology concepts in the senior secondary school Biology syllabus. Nutrition can only be meaningful to students if it is taught in an appropriate manner. Although, nutrition is not commonly identified as a difficult area in Biology, sometimes teachers may not pay enough attention to some areas (Okebukola, 1994). Hence, some teachers may find nutrition difficult to teach. Nutrition makes it clear that living things have different modes of feeding; it explains food and the concepts of balanced diet; it highlights the types and roles of digestive enzymes etc. (Sarojini, 2010). In spite of its importance, nutrition may be easy to teach for some Biology teachers, while some of its concepts may be difficult to teach by others. Some of the reasons advanced for these problems are:

1. Lack of interests and understanding of concepts, which may stem from poor background of the undergraduate Biology programme (Bello, 1996).

2. Some biology teachers may show serious inclination toward the teaching of nutrition concept; others may not (Oyeyemi, 1991).
3. Senior secondary school students lack understanding of some basic Biology concepts and how they are related (Johnstone & Mahmoud, 1980).

In view of these reasons, it is necessary to investigate the difficulty level of nutrition concepts held by the Biology secondary school teachers. This will be looked into under the following variables, experience and the location of school of the Biology teacher.

Difficulty of concepts in sciences is not a new thing. As Finley, et al (1982) investigated contents that are important but perceived as difficult by Earth science, Physics, Chemistry and Biology Teachers. Their subjects were one hundred Wisconsin High school teachers. The researchers asked the subjects to rate the importance and difficulty of selected content areas. Mean rating and standard deviation were used to rank the first fifteen (15) most important and most difficult areas in each of the four science subjects. The researchers found that the most important but difficult topics included Photosynthesis, Cellular respiration, Mendelian genetics, Chromosome theory of heredity and hormonal control of human reproduction but not nutrition.

In view of the fact that the teacher is to transform the philosophy and goals of education into learners' values, for the full benefit of the learner, he is expected to carry out some specific roles in the educational process. Based on this, Ryans (1960) analysed, among others, the roles of the teacher in the educational system to be:

1. A representative of the society to inculcate its moral values, attitude and to improve perception
2. A resource person that possesses skills, competence and knowledge.
3. A detective of anxiety, an ego supporter and a leader.

Awoyemi (1985), Saha (1983) and Fafunwa (1974) all wrote about the influence of teachers' experience on teacher's competence. Awoyemi (1985) studied the relationship between teachers' years of experience and effectiveness. One thousand, two hundred and eighty (1280) secondary school student in forms four (4) and five (5), and one hundred and ninety-one (191) teachers in Kwara State participated in the study. His result showed that teachers' years of experience had great influence on teachers' effectiveness. There have been many researches on the influence of school location on teacher, as well as, student knowledge of science concepts. Review of what other researchers have done on the effect of location on the rating of difficulty level of concepts by Biology teachers was however limited. Daramola (1982), Okeke and Ochuba (1986), Obi (1979), Inomiesa (1989) and Oyebanji (2000) all looked at the influence of school location and the effectiveness of teachers and performance of science students. In her own study, Oyebanji (2000) looked at the influence of school location on the ratings of biology teachers teaching of ecological concepts. The researcher sampled one hundred and seventy eight (178) teachers selected from three local government areas of Ilorin, Kwara State, Nigeria, end used chi- square to rate the subjects responses sex-wise. The results indicated no significant difference in the ratings of urban and rural Biology teachers, based on the level of difficulty of most ecology concepts.

From the literatures reviewed, it is clear that an investigation on difficulty level of nutrition concepts is researchable, considering the fact that content difficulty is relevant in Biology. Various approaches used by the previous researchers included multiple choice questions,

Clinical interview, objective and essay tests but this study used questionnaire design for teachers in Ilorin metropolis. Fakuade (1973), worked on Mathematics difficulty; Ibitoye (1990) worked on difficulty in Agricultural science; Opobiyi (1996) worked on difficulty in Chemistry while Chukwukadibia (1980) worked on difficulty in Biology. Other areas looked at are ecology by Johnstone and Mahamuod (1980), genetics by Oyeyemi (1991). None of the studies addressed specifically nutrition concepts, as perceived by the secondary school Biology teachers. Therefore, this study probes into the difficulty level of nutrition concepts as perceived by Biology teachers.

Purpose of the study

The purpose of this study was to analyse the ratings by different categories of Biology teachers, on the level of difficulty of concepts in nutrition, in secondary schools. The study also identified reasons given for the level of difficulty of each concept.

Specifically, the study carried out analysis of Biology teachers' ratings of the level of difficulty of nutrition concepts. That is, the present study found out:

1. Those concepts in nutrition, Biology teachers may find difficult to teach.
2. Reasons given for the difficulty of the concepts.
3. Examine the influence of Biology teachers' variables like teachers' experience and location of teachers' school, on their perception of difficulty level of nutrition in Biology.

Research questions

In this study, attempt was made to provide answers to the following questions:

1. How do Biology teachers rate the concepts in nutrition? Was it very difficult, moderately difficult or easy?
2. What reasons do the Biology teachers give for their ratings of the level of difficulty of concepts in nutrition?
3. How do less-experienced and experienced Biology teachers rate the level of difficulty of nutrition concepts?
4. Does location of school (rural or urban) of Biology teachers influence their ratings on the level of difficulty of concepts in nutrition?

Research Hypotheses

The following null hypotheses were formulated and tested in the course of the study:

HO_1: There is no significant difference in the ratings of the level of difficulty of concepts in nutrition based on teachers' teaching experience.

HO_2: There is no significant difference in the ratings of the level of difficulty of concepts in nutrition based on the location of teachers' schools.

Methodology

The study was a descriptive research of the survey type, using questionnaire instrument.

Sample and Sampling Technique

The total population for the study was all the senior secondary school Biology teachers in Ilorin metropolis, but purposive sampling was used select one hundred and forty-eight (148) Biology teachers from forty-seven (47) secondary schools in the three Local Government Areas of Ilorin namely, Ilorin East, West and South. One hundred and forty-eight (148) copies of the

questionnaire were administered to teachers across the sampled schools. The analysis was based on two (2) variables of

1. Teacher's Teaching Experience and
2. Location of Schools of Teachers

Instrument

The instrument used for the study was a two-sectioned questionnaire designed by the researcher. Section 'A' elicited teachers' personal information, while section B contained 35 nutrition concepts. Three difficulty levels were provided against each concept. Respondents were required to choose one of the difficulty level options. More so, six reasons were suggested to the teachers for the difficulty level and respondents were expected to choose the reasons that were responsible for the difficulty of each concept.

Validation of the Instrument

The instrument for data collection was validated by two curriculum experts and three Biology teachers in Ilorin east Local government Area of Kwara state. Their corrections and scrutiny were taken to improve the questionnaire to make the final draft. The instrument was also subjected to reliability test through test and re-test method on fifteen teachers in three schools outside the selected schools of sample. Pearson product moment correlation coefficient was used to determine the reliability at 0.05 significance level. This gave a coefficient of 0.86 which was felt good enough for the study.

Method of Data Collection

Permission was sought from the principal of the sampled schools to administer questionnaire to the Biology teachers. The questionnaire was personally administered to the respondents by the researcher to ensure that the questionnaire items were properly filled. Copies of the questionnaire were collected back on the same day of administration.

Data Analysis and Results

Four (4) research questions and two (2) hypotheses were analysed. Research questions one and two were answered using frequency counts, average weighted mean and standard deviation scores, while research questions three and four were transformed into hypotheses one and two, which were tested using Chi-square (X^2) statistical analysis.

Research questions one and two which state that

1. How do biology teachers rate the concepts in nutrition; very difficult, moderately difficult or easy to teach?
2. What reasons do the biology teachers give for their ratings?

were answered in the Table 2:

Table 2: Rating and reason for rating of difficulty level of nutrition concepts

S/N	Topics/Concepts	Weighted Means	Standard Deviation	Reasons for level of difficulty
1	Herbivorous Nutrition	0.7637	±0.721	Insufficient Teaching Experience
2	Energy and Material build up	0.7680	±0.677	Abstractness
3	Carnivorous Nutrition	0.7703	±0.755	Insufficient Teaching Experience
4	Food Substances	0.7703	±0.755	Complexity
5	Pyramid of Energy	0.7703	±0.658	Complexity
6	Omnivorous Nutrition	0.7793	±0.752	Insufficient Teaching Experience
7	Second Law of Thermodynamics	0.7816	±0.568	Abstractness
8	First Law of Thermodynamics	0.7817	±0.556	Abstractness
9	Food Chain	0.7927	±0.588	Abstractness
10	Saprophytism	0.8197	±0.552	Abstractness
11	Nitrogen Cycle	0.8220	±0.576	Lack of Teaching Aids
12	Mineral Requirements of Plants	0.8267	±0.566	Abstractness
13	Properties & Functions of Cell Nutrition	0.8310	±0.577	Abstractness
14	Holozoic Nutrition	0.8400	±0.577	Insufficient Teaching Experience
15	Carbon Cycle	0.8400	±0.553	Lack of Teaching Aids
16	Micro Elements	0.8400	±0.528	Abstractness
17	Water Cycle	0.8447	±0.611	Lack of Teaching Aids
18	Chemosynthesis	0.8537	±0.550	Abstractness
19	Decomposition in Nature	0.8603	±0.572	Abstractness
20	Parasitism	0.8725	+0.523	Sophistication
21	Roles of Enzymes	0.8760	±0.586	Abstractness
22	Macro Elements	0.8807	±0.560	Abstractness
23	Pyramid of Numbers	0.8837	+0.519	Complexity
24	Territoriality	0.8873	±0.529	Complexity
25	Trophic Level	0.8873	±0.502	Abstractness
26	Commensalism	0.8920	±0.511	Complexity
27	Consumer Organism	0.8940	±0.535	Complexity
28	Symbiosis	0.9053	±0.467	Complexity
29	Photosynthesis	0.9120	±0.457	Abstractness

30	Balance Diet	0.9143	±0.454	Complexity
31	Usefulness of Food	0.9257	±0.418	Complexity
32	Food Web	0.9280	±0.489	Abstractness
33	Digestive Enzymes	0.9323	±0.420	Abstractness

From the table, it was discovered that many of the nutrition concepts were rated to be easy to teach while a few of them were rated as difficult to teach. Concepts as herbivorous, carnivorous, omnivorous, holozoic, parasitic and saprophytic are rated easy to teach, while others like energy and material build up, first and second laws of thermodynamics and food chain are rated difficult to teach. The most adduced reason for teachers rating difficulty is abstractness of the concept, followed by complexity while content not studied in the university is the most uncommon reason given. Also, reasons were given for rating difficulty.

Hypotheses 1 and 2

Table 3 shows the X^2 result of hypothesis 1, which states that There was no significant difference between less-experienced and experienced Biology teachers' ratings of the level of difficulty of concepts in Nutrition.

Table 3: Chi-square Analysis of Mean Overall Responses of Less-experienced and Experienced Biology Teachers' Ratings on the Level of Difficulty of Nutrition Concepts

S/N	Variable	Very Difficult	Moderately Difficult	Easy	Total	E.Value	X^2	Significance
1	Less-experienced	13.0	9.0	38.0	60.0	5.99	6.50	S.
2	Experienced	29.0	22.0	37.0	88.0			
	TOTAL	42.0	31.0	75.0	148.0		*	*

Table 3 presents results of chi-square analysis of the overall mean responses of the teachers regarding the 33 nutrition concepts investigated. This was derived by calculating the average of all the 148 responses for each of the 33 concepts. The x^2 value was calculated using the average value. From this, it can be seen that the x^2 value is 6.50. This means that averagely, there is significant difference between the overall ratings of the less-experienced Biology teachers and their experienced counterparts on the level of difficulty of the 33 nutrition concepts. The study showed that the overall calculated x^2 is 6.50, which is greater than that the expected (i.e. 5.99). It can, therefore, be concluded that there is significant difference in the responses of the biology teachers on the level of difficulty of the thirty-three (33) nutrition concepts based on their experience. The stated hypothesis is thus rejected.

Table 4 shows the X^2 result of hypothesis 2, which states that:
Location of teacher's school has no significance influence on their rating of the level of difficulty of nutrition concepts.

Table 4: Chi-square Analysis of Mean Overall Responses of Rural and Urban Biology Teachers' Ratings on the Level of Difficulty of Nutrition Concepts

S/N	Variable	Very Difficult	Moderately Difficult	Easy	Total	E.Value	X^2	Significance
1	Rural	2.0	0.0	4.0	6.0	5.99	1.68	N.S.
2	Urban	40.0	31.0	71.0	142.0			
	TOTAL	42.0	31.0	75.0	148.0		*	*

Table 4 represents the average value of the analysis of the X^2 of the 33 nutrition concepts based on the academic qualification of teachers. The overall X^2 calculated is 1.68, which is less than 5.99 at 0.05 alpha level. This revealed that there is no significant difference in the overall ratings of the Biology teachers based on the location of their schools on the nutrition concepts. The researchers therefore did not reject the hypothesis, which states that location of schools of teachers has no significant influence on their ratings of the level of difficulty of nutrition concepts.

The reasons given by the respondents for their difficulty, included abstractness (48.4%), Complexity (27.3%), Insufficient teaching experience (12.1%), Lack of teaching aids (9.1%), sophistication (3.1%) and content not studied in the university (0%).

Summary of the major findings

From the foregoing analysis and results, the following are the major findings in this study from the teachers' responses.

1. Biology teachers, no matter their experience or the location of their schools have similar ratings on the level of difficulty for each nutrition concepts.
2. Biology teachers have similar reasons for the difficulty level of each of the nutrition concept, irrespective of their experience or location of their school.
3. Experience of the Biology teachers affects their ratings on the level of difficulty of each nutrition concepts.
4. Location of schools of Biology teachers did not influence their ratings on the level of difficulty of nutrition concepts.

Discussion, Conclusions and recommendations

This study was carried out to reveal which nutrition concepts are difficult and their difficulty level. Reasons were also given for their difficulty. The research was carried out to examine two variables:

1. Biology teachers ratings based on their experience
2. Biology teachers ratings based on the location of their schools

Reasons were also given by biology teachers on the level of difficulty of nutrition concepts.
The result of the study showed that include abstractness, complexity, sophistication, content not studied in the university, insufficient teaching experience and lack of teaching aid. From the analysis and findings of this study, it is logical to conclude based on the research questions that:

1. 28.40% of the Biology teachers' agreed that nutrition concepts are very difficult; 20.90% moderately difficult, while the rest 50.70% were of the opinion that nutrition is easy.

2. Biology teachers agreed that nutrition concepts are difficult due to the following reasons in their descending order of difficulty.

Reasons for the adduced difficulty	Frequency counts	Percentage
Abstractness	16	48.40%
Complexity	9	270.3%
Insufficient teaching experience	4	12.10%
Lack of teaching aid	3	9.10%
Sophistication	1	3.10%
Content not studied in the university	0	00%

3. There was a significant difference between the ratings of less-experienced and the experienced biology teachers on the level of difficulty of nutrition concepts.
4. However, there was no significant difference between the ratings of teachers in rural and urban schools on the level of difficulty of nutrition concepts.
   Based on the research findings and observations made in the course of this study, the

following recommendations are made:

1. The identified difficult concepts should be handled by well-skilled and experienced teachers, since teaching experience had significant influence on the teachers' ratings.
2. Biology teachers should be exposed to more practical work to take care of abstractness in their teaching.
3. School Management Boards should provide better laboratory and teaching facilities in the schools to assist or ease the teaching of science subjects generally, Biology and nutrition concepts in particular.
4. Science teachers should be allowed to go for government-sponsored training programmes and workshops to enhance their subject matter knowledge and teaching skills.
5. Future researchers should improve on this study by looking into other factors that could affect the teaching of nutrition concepts of the senior secondary Biology syllabus.

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