

Full Length Research Paper

Identification of Students' Perceived Difficult Concepts in Senior Secondary School Chemistry in Oju Local Government Area of Benue State, Nigeria

Peter Ogbu Agogo and Margaret Omagbu Onda

Department of Curriculum and Teaching, Benue State University Makurdi, Nigeria

Corresponding Author's E-mail poagogo2007@gmail.com

Accepted April 7th, 2014

The study investigated into the identification of students' perceived difficult concepts in senior secondary school chemistry in Oju Local Government Area of Benue State, Nigeria. Four research questions and three hypotheses were raised and formulated. 95 SSII chemistry students were used. The instrument for data collection was the chemistry students' concept difficulty assessment questionnaire. The research questions were answered using percentages and mean scores while the hypotheses were analyzed using chi-square at 0.05 level of significance. It was found that there is no significance difference between male and female chemistry students in their perception of difficult concepts in SSII chemistry. It was recommended that both male and female chemistry students should be encouraged to learn chemistry with greater emphasis on female students.

Keywords: identification, perceived difficult concepts, senior secondary school, chemistry.

INTRODUCTION

Background to the Study

The relevance of science to national goals, aspirations and economy dictates to a large extent, the huge commitment and support which nations make and give to science and technology advancement. This may be the reason why Achor (2006) and Ada (2008) opined that as a result of the speed at which the world is changing technologically, the need and usefulness of teaching and learning of science therefore cannot be over looked. The teacher of science and technology is the means through which the skills and knowledge get to the learners. The classification of nations into developed, developing and underdeveloped is based on their technological advancement (Agogo, 2009, Maduawesi, Aboho and Okwuedei, 2010).

In Nigeria, the three major sciences, Biology, Chemistry and Physics are taught at the senior secondary school level. This has equipped the young graduates to be prepared for science and science-based courses at the Tertiary level. According to the National Policy on Education (FRN, 2004), chemistry education

should be emphasized at the secondary school in terms of its teaching and learning. This is because; chemistry as an academic discipline plays a very significant role in unifying other science subjects. Chemistry is therefore seen as the central science and the mother of all sciences (Agogo & Otor 2013), and as a branch of pure science that deals with composition of matter and the principle (Mailumo, Agogo, and Kpagh, 2007). However, there has been consistent decline in the performance of students in public examinations conducted by the west African Examination Council (WAEC) and the National Examination Council (NECO) in sciences across the country over the years (Agogo, 2003; Samba & Eriba, 2012). The WAEC also confirmed this decline in chemistry performance by the students in their WAEC Chief Examiner's Reports (2011, 2012).

Many reasons were adduced as to this poor performance in chemistry. According to Samba and Eriba (2012), it is due to the abstract nature of chemistry concepts, while Mailumo, Agogo and Kpagh (2007)

hinged it on students and teachers related factors. Others think it is due to concepts difficulty (Agogo, 2003, Agwi, 2008). There are however difficult levels of concept difficulty experienced by chemistry students (Agogo, 2003), and these concepts perceived difficult are experienced by both boys and girls. It should be stressed that the sex-role stereotyping has affected the type of education provided for the female in Nigeria and in many parts of African (Olikped and Amadi, 2001). Sex-role stereotyping also influences the classroom interaction patterns of students and teachers. Gender stereotyping in chemistry therefore arises from different social roles, which ultimately affect the way they perceive chemistry concepts.

The ability of the chemistry teachers to comprehend and internalize concepts and skills are determined not only by individual differences, but also by the teachers' effectiveness in terms of his/her teaching experience and qualifications. Educators therefore emphasized on the qualification of teachers in the proper execution of their professional mandate. Such teachers are expected to perform academic roles as well as leadership roles that are related to the successful and meaning teaching and learning of their specialized subject. The qualification of the chemistry teacher will therefore enable them to competently handle all concepts in chemistry (Mailumo, Agogo and Kpagh, 2007).

Perception is one of the mental processes or skills human beings engage in. It is a cognitive activity in learning which is seen as the process of making sense out of something (Agogo, Ogbeba and Damkor-Ikpa, 2013). However Ortese, Yaweh and Akume (2006) posited that learners' perception is often affected by a given number of factors, such as interest, motivation, attention, self concept as well as thinking and creativity. This is why Agogo (2003) observed that what may appear difficult to somebody may be easy to another person because the concepts of easiness or difficulty as perceived by somebody are dynamic. Whatever is the case, concept difficulty invariably affects students' performance in such a subject.

Purpose of the Study

The purpose of this study is to investigate into the students' perceived difficult concepts in senior secondary school chemistry in Nigeria. Specifically it sought to:

- i. Identify the concepts in senior secondary II students perceive difficult to learn.
- ii. Find out if gender influences students' perception of difficult concepts in senior secondary school II chemistry.
- iii. Find out if the teachers' qualification influences the concepts senior secondary II students perceive difficult

in chemistry.

- iv. Find out the causes of concept difficulties by senior secondary II chemistry students in Oju Local Government Area.

Research question

The following research questions are raised to guide the study.

- i. What chemistry concepts do senior secondary II students perceive as difficult?
- ii. To what extent is gender a factor in the chemistry concepts senior secondary II students perceive difficult to learn?
- iii. To what extent does qualification of the teacher influences senior secondary II students' perception of difficult concepts in chemistry?
- iv. What are the causes of the difficulties experienced by the senior secondary II students in chemistry?

Hypotheses

The following null hypotheses are formulated and tested at 0.05 level of significance.

H^o1 There is no significant difference between male and female chemistry students in their perception of difficult concepts in SSII chemistry.

H^o2 There is no significant relationship between teachers' qualifications and students' perceived difficult concepts in senior secondary II chemistry.

METHODOLOGY

The study employed survey design. The study was carried out in Oju local government Area of Benue state, Nigeria. It is located geographically on latitude 6^o 85¹ North and longitude 8^o 45¹ East of the globe. It is a semi urban settlement. The study area has a total of 20 government approved senior secondary schools. The population consists of all the senior secondary II students in the study area, out of which 100 senior secondary II chemistry students were sampled using stratified random sampling method, from five secondary schools, meaning that, 20 chemistry students from each school.

The instrument used for data collection was the Chemistry Students Concepts Difficulty Assessment Questionnaire (CSADAQ). It consisted of sections A and B. Section A contains the biodata, while Section B consists of senior secondary II (SSII) concepts, two items on gender issues and two items on SSII chemistry teachers qualification and students perceived difficult

Table 1. Students perception scores for research question one (SSII major chemistry concepts).

S/N	Concepts in the II Chemistry	VD	D	%	MD	ND	%
1.	Periodic table	7	9	16.8	41	48	83.20
2.	Chemical reactions	22	10	33.70	32	31	66.30
3.	Mass volume relationship	41	10	53.70	24	20	46.30
4.	Acid-base reactions	16	16	33.70	20	43	66.30
5.	Air and pollution	5	13	18.90	50	27	81.10
6.	Water and solution	8	16	25.30	60	11	74.70
7.	Hydrogen & Reactivity series	30	26	59	18	21	41
8.	Oxygen & its compounds	10	21	32.60	24	50	67.40
9.	Sculpture & its compounds	26	18	46.40	21	30	53.70
10.	Halogens & its compounds	11	30	43.20	15	39	56.70
11.	Nitrogen & its compounds	27	10	39	40	18	61
12.	Oxidation reduction reactions	32	8	52.10	15	40	57.90
13.	Ionic theory	29	31	63.20	19	16	36.80
14.	Electrolysis	9	30	37.90	26	30	62.10
15.	Hydrocarbons	40	23	66.30	20	12	33.70
16.	Introduction to organic chemistry	9	19	29.50	20	47	70.50
17.	Ackanols, Akanoics Alkanoates	40	21	64.20	14	20	35.80

concepts. The instrument was validated by two experts in chemistry Education from the Department of Curriculum and Teaching (science Education Unit), Benue State University, Makurdi, Nigeria. From the instrument administered only 95 of them were returned, by the respondents, which were used for the analysis. The instrument was administered to the 95 SSII chemistry students with an aid of a research assistant. The data obtained were scored and analyzed. The Likert scale type was scored as follows

Very Difficult	VD	4 points
Difficult	D	3 points
Moderately Difficult	MD	2 points
Not difficult	ND	1 point

However, Likert scale was scored as follows

Strongly Agreed	SA	5 points
Agreed	A	4 points
Undecided	U	3 points
Disagreed	D	2 points
Strongly Disagreed	SD	1 point

The research questions were answered using percentages while the hypotheses were analyzed using chi-square at 0.05 level of significance. The scores for Very Difficult (VD) and Difficult (D) are merged to show Difficult while those of Moderately Difficult (MD) and Not

Difficult (ND) are merged to show Not Difficult, in the analysis of the research questions.

RESULTS

The research questions are answered and hypotheses analyzed.

Research question One

What chemistry concepts do senior secondary II students perceive as difficult?

From table 1, the following concepts are perceived difficult to learn by the SSII chemistry students in the study area, because their percentages are above 50%.

- Mass volume relationship - 53.70%
- Hydrogen and reactivity series - 59%
- Ionic theory - 63.20%
- Hydrocarbons - 66.30%
- Alkanols, Alkanoics, Alkanoates - 64.20%

Those not perceived difficult to learn are the remaining twelve concepts that scored less than 50% in the difficult column.

Research question Two

To what extent is gender a factor in the chemistry concepts SS II students perceive difficult to learn?

Table 2. Mean and percentage scores of gender perception of difficult concepts by SS II chemistry students

Gender	Difficult	Mean (x)	Percentage
Male	73	6.56	76.80
Female	22	7.41	23.20

Table 3. Influence of teachers' qualification on students' perception of difficult concepts in chemistry

S/N	Items	SA	A	U	D	SD	TE
1.	Lack of qualified teachers makes my learning of chemistry concepts difficult.	40	20	5	25	5	95
2.	My chemistry teachers' qualification affects the way he/she explains chemistry concepts in the class.	29	34	2	10	20	95
	Sub-total	69	+ 54	7	35	+ 25	
	Combined total	=123		7		=60	
	Percentage (%)	64.70		3.70		31.60	

Table 2 shows that 73 respondents representing 76.8% from males perceive the concepts difficult while 22 respondents which represent females and a mean of 7.41, of SS II chemistry students perceive the concepts difficult.

Research question three

To what extent does qualification of the teacher influence senior secondary II students' perception of difficult concepts in chemistry?

In table 3, strongly agree (SA) is combined with Agree (A) to give positive response, undecided is left as neutral response while Disagree (D) with Strongly Disagree (SD) are combined to give negative response. It therefore means that, 64.70% of the respondents said that lack of qualified chemistry teachers influence their class activities and so SS II students perceive some concepts difficult to learn. 31.60% of the respondents said that teacher's qualification does not influence their perception of SS II concepts difficulty while 3.70% of them were not sure.

Research question four

What are the causes of the difficulties experienced by the Senior Secondary II students in chemistry? From the articulation of the response, the following

reasons were given as the causes of the difficulties experienced by the SS II chemistry students.

1. Abstract nature of the chemistry concepts
2. Inadequate practical periods per week
3. Lack of instructional materials for practical activities
4. Poor knowledge of Mathematical aspects of chemistry by students.
5. Language problem experienced by students
6. Textbook not available, when available, are old and out dated
7. The teachers do not understand the concepts well, so they jump concepts.
8. Too many students in the class leading to over crowdedness.

Hypotheses one

There is no significant difference between male and female chemistry students in their perception of difficult concepts in SS II chemistry.

Table 4 shows that χ^2 calculated (0.836) is less than χ^2 tabulated (7.82) at $df = 3$. This means that the null hypothesis is not rejected, implying that, there is no significant difference between male and female chemistry students in their perception of difficult concepts in SS II chemistry.

Table 4. Chi-square analysis for male and female SS II chemistry concept difficult.

Gender	VD	D	MD	ND	df	χ^2_{cal}	χ^2_{tab}	Decision
Male	120	359	300	401	3	0.836	7.82	Not rejected
Female	100	63	122	150				

Table 5. Chi-square analysis for chemistry teacher's qualification.

Items	SA	A	U	D	SD	df	χ^2_{cal}	χ^2_{tab}
1 Lack of qualified teachers make my learning of chemistry concepts difficult.	40	20	5	25	5	4	1.36	9.49
2 My chemistry teachers' qualification affects the way he/she explains concepts in the class.	29	34	2	10	20			

Hypothesis two

There is no significant relationship between teachers qualification and students' perceived difficult concepts in senior secondary II chemistry.

From table 5, χ^2 calculated (1.36) are less than χ^2 tabulated (9.49) at $df = 4$. This means that the null hypothesis is not rejected, implying that there is no significant relationship between teachers qualification and students' perceive difficult concepts in senior secondary II chemistry.

DISCUSSION OF FINDINGS

From the analysis of the data, the hypotheses and the research questions are discussed. From table 1, four concepts in SS II chemistry syllabus are perceived difficult by the students in Oju Local Government Area of Benue State, Nigeria. This is in agreement with Agogo (2008) and Agwai (2008) in their separate researchers that students usually perceive some senior secondary school chemistry concepts difficult to learn. This means that students may not perform well in their final year examination if the sources of difficulties are not removed. The study also found that there are some reasons why chemistry students find some concepts difficult to learn.

From the research questions it was found that 76.80% of the male chemistry students said that gender is a factor in the chemistry concept SS II students perceive difficult to learn while 23.20% of the female said no. However, from the statistical analysis of the hypothesis, it was established that there is no significant difference between male and female chemistry students in their perception of difficult concepts in SS II chemistry. This is in disagreement with Agogo (2003) and that gender has

influence on students' perception of difficult concepts in chemistry. However, Agogo (2008) established that there are different levels of concept difficulty experienced by boys and girls in their study of science. From the research question, 64.70% of the respondents agreed that lack of qualified chemistry teachers influence their perception of concept difficulty in chemistry. In the analysis of the hypothesis, it was found that there is no significant relationship between teachers' qualification and students' perceived difficulty in SS II chemistry. This finding is in disagreement with Fadipe (2000) in Ada (2010) who said that the qualification of a teacher is of paramount importance to the teaching and learning of difficult concepts in sciences. This is why Mallam (2004) opined that the teachers are said to be all knowledgeable and are expected to transfer useful knowledge and skills to the learners during teaching.

RECOMMENDATIONS

From the findings, it is recommended that:

1. Qualified teachers should be employed to teach chemistry who is expected to combine teaching experience with their qualification to effect learning.
2. Both male and female chemistry students should be encouraged to learn chemistry with greater emphasis on female students.

CONCLUSION

There has been unsatisfactory level of chemistry teaching and learning in many Nigerian secondary schools. This may be because some students find some concepts in chemistry difficult to understand. This has therefore affected their performance in the subject.

Several factors have been found as to the cause of the students' perceived concept difficulty in SS II chemistry. This study explored variables such as gender difference in their perception of concept difficulty as well as the chemistry teachers qualification. Though it was found that there is no significant relationship between teachers' qualification and the students perceived difficult concepts in SS II chemistry, it is however, important for the chemistry teachers to be professionally qualified to teach the subject, so as to positively affect the students.

REFERENCES

- Achor EE (2006). Issues in science and society. Nsukka, Nigeria: Great A. P. Express Pub. Ltd.
- Ada NA (2010). Curriculum and Instruction: An introduction to general methods and principles of teaching. Makurdi, Nigeria: Traces (Nig) Ltd.
- Ada NA (2008). The Challenge of Curbing Examination Malpractice in Nigeria's Educational System. Paper presented at the 5th Faculty of Education National Conference, Benue State University.
- Agogo PO, Otor EE (2013). Basic issues in the chemistry of matter Ibadan, Nigeria: Optimism Press.
- Agogo PO (2009). Topics in primary science education in Nigeria. Makurdi: Azaben Press.
- Agogo PO (2008). Identification of Science related cultural practice among primary school pupils in Benue State, Nigeria. *J. Nat. Assoc. Sci., Humanit. Educ. Res. (NASHER)*, 6(3):126-133.
- Agogo PO (2003). A practical guide to the teaching of difficult in Nigerian secondary school. *Knowledge Review: A Multi-disciplinary J.* 6(3):32-34.
- Agogo PO, Ogbeba JA, Damkor-Ikpa M (2013). Basic facts about teaching practice in Nigeria. Makurdi: Eagle Prints.
- Agwai V (2008). Strategies for improving students interest in learning scientific concepts. *J. Res. Educ.* 2:225-230.
- Chibuogwu VN, Mars Chibueze AS (2001). Towards Gender Equality in Nigeria/ Umunze: Research and Conference Unit. Federal Republic of Nigeria (2004). National Policy on Education. Abuja: FME.
- Maduewesi BU, Aboho DA, Okwuedei CA (2010). A practical guide to curriculum development. Onitsha, Nigeria: West and Solomon Publishing Coy Ltd.
- Mailumo PH, Agogo PO, Kpagh JE (2009). Education in Fundamental Chemistry. Makurdi: Journal of Publishers (Nig.) Ltd.
- Mallam JA (2004). Types of learners and implication for teaching. In Oyetunde, T. O. Mallum YA and Andzay CA. (Eds). *The practice of teaching: Perspectives and strategies* Jos: LECAPS Publishers.
- Olikpe I, Amadi O (2001). Effective Women Education in Nigeria: Issues and Strategies. In Chibuogwu and Mars (Eds). *Towards gender equality in Nigeria* (53.59). Umunze: Research and Conference Unit.
- Ortese PT, Yaweh A, Akume GT (2006). Psychology of learning. *Educational psychology series II*. Makurdi: Ugo Printing Press.
- Samba RMO, Eriba JO (2012). Background information on teaching difficult science concepts. In Samba RMO and Eriba JO. (Eds). *Innovative Approaches in teaching difficult science concepts* (pp.1-5) Makurdi, Nigeria: Destiny Ventures.
- West African Examination Council (WAEC) (2011, 2012). Chief examination reports (2011, and 2012). Lagos: WAEC.