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Perception of Difficult Topics in Chemistry Curriculum by Senior Secondary School (II) Students in Imo State

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Abstract

This research work was carried out to identify topics the students perceive difficult in senior secondary school II Chemistry curriculum in Imo state using government secondary schools in Owerri Municipal Council of Imo state. The research is a case study survey designed to identify topics SS II Chemistry students perceived difficult to understand in the area under study. Some research questions were generated to guide the study. Four hundred and ten SS II chemistry students were used for the study. The instrument used for the data collection was a questionnaire designed by the researchers to elicit information from the students. Data collected were analyzed using mean scores. Findings revealed that SS II Chemistry students perceived some Chemistry topics difficult. Chemistry syllabus being too wide and involving too many calculations, lack of qualified Chemistry teachers and students' perception of Chemistry as being too abstract are some of the reasons for the difficulties in understanding the topics. Based on the findings, it was recommended that Curriculum planners should look into the Curriculum and make provisions for more practicals and illustrations of different concepts in Chemistry

1. Introduction

Poor performance is unhealthy to a nation whose adverse goal is to make significant changes and advancements in Science and Technology. To Eke (2008), poor performance does not connote abnormality in development, but involves those who probably could perform better. Poor performance in chemistry is a pointer to the fact that students have difficulty in learning and mastering the subject and applying these when they are under examination conditions.

Chemistry is one of the science subjects students are taught in secondary schools to prepare them for science - based courses at the tertiary levels and if not properly handled affects their performances at higher levels. According to the National Policy on Education (FRN 2004), Chemistry education should be emphasized in the secondary schools in terms of teaching and learning, because Chemistry as an academic discipline plays a very significant role in unifying other science subjects. But the problem is that students fail chemistry at alarming rates in secondary schools for years now. The tremendous increase in students' failure is seen in examinations conducted by Senior

Secondary Certificate Examination (SSCE) and National Examination Council (NECO) across the country (Agogo and Onda 2014; Uchegbu *et al.*, 2015). Many studies revealed that it is as a result of lack of qualified teachers, lack of teaching materials, lack of motivation etc.

Though many people have contributed their ideas to why students fail Chemistry yet the problem keeps on increasing. Hence, It becomes necessary to investigate on the topics the students learn, to find out from the students themselves if the topics are difficult to them or not.

Gongden *et al.*, (2011) carried out a study on “Assessment of the difficult areas of the senior secondary school 2 (two) chemistry syllabus of the Nigerian Science curriculum”. The senior secondary two chemistry course content of the Nigerian science curriculum was assessed using co-selected secondary school in north central Nigeria to determine areas of difficulty, magnitude and reasons for such perceived difficulty. Correlations between the students’ perceived difficulty and their achievement in a test and the relationship between the students set and their perception of difficulties were also examined using a difficult rating scale questionnaire and a chemistry achievement test. A total of 10 out of 24 topics identified were perceived as difficult. Reasons given for the perceived difficulty included unfamiliarity with ideas, confusing language, ideas too demanding, insufficient explanation and practical work, topics too mathematical and lack of interest among both sexes

Jimoh (2010) carried out a research on, “perception of difficult topics in chemistry curriculum by students in Nigeria Secondary schools”. In his study, five hundred and sixty SS III Chemistry students were randomly selected from 28 senior secondary schools in seven states of the federation and a 20-item questionnaire was administered to respondents. Findings showed that SS 3 chemistry students perceived 13 topics (65%) difficult to comprehend. The study also revealed that students’ gender and school location have no influence on their perception of difficult topics in chemistry curriculum, while school nature influenced perception of chemistry topics. It was recommended that the SSCE chemistry curriculum be reviewed by examination bodies.

Agogo and Onda, (2014) carried out a study on “Identification of students’ perceived difficult concepts in senior secondary school chemistry in Oju L.G.A of Benue state.” In their study, 95 SS II chemistry students were used. The instrument for data collection was the chemistry students’ concept difficulty assessment questionnaire. Four research questions and three hypotheses were raised and formulated. The work was analyzed using percentages and mean scores while the hypotheses were analyzed using chi-Square at 0.05 level of significance. Their findings revealed that students find some topics difficult and there is no significant difference between male and female in their perception of difficult concept in SS II chemistry.

This study however tends to find out if Senior Secondary II students in Owerri Municipal Council of Imo state perceive Chemistry concepts difficult to learn and to find out the causes of concept difficulties by SS II Chemistry students.

1.1. Statement of Problem / Purpose of Study

Senior Secondary School Chemistry results over the years have been consistently below average (Ampiah, 2001). These students carry the same poor performances to the tertiary institutions. Studies have shown that students’ underperformance in chemistry at the undergraduate level were due to the poor background of chemistry from pre-university level, that the students find chemistry concepts very complicated and that the students did not want to put in effort themselves rather believed in spoon-feeding by their instructors (Mahajan and Singh, 2005). Poor academic performance has been observed in school subjects especially mathematics, chemistry and English language among secondary school students (Adesemowo, 2005). Aremu and Sokan, (2003) stressed that academic failure is not only frustrating to the students and the parents, its effects are equally grave on the society in terms of dearth of manpower in all spheres of the economy and politics. Tertiary institutions are finding it difficult to enroll sufficient numbers of candidates in chemistry departments because of dwindling numbers of students satisfying the entrance requirements (Takawira and Admire (2012). This can have adverse effects on the advancement of science and technology in the country. This study therefore seeks to look into the chemistry curriculum studied by the students, to find out from students themselves if the curriculum is difficult to them or not.

1.2. Research Questions

The following research questions were raised to guide the study:

- i. What topic in the senior secondary school chemistry syllabus do students perceive as difficult?
- ii. What are the causes of the difficulties experienced by the senior secondary II Students in chemistry?

2. Methodology

This study is a case study survey designed to identify students’ perceived difficult topics in learning of chemistry in the secondary schools in Imo state, Eastern part of Nigeria. A case study survey research is a research design in which a survey is administered to a case either a small sample or an entire population of individual to describe an aspect or characteristics of that population. Here, researchers ask individuals in the population questions to examine individual self-reports of opinions, behaviors, abilities, beliefs or knowledge. The study was carried out with the government owned secondary schools located within the Owerri Municipal Council of Imo state, Nigeria. Owerri Municipal Council is an urban settlement. It is located at the southern part of Imo state and it is the heart of Owerri capital city. It has a boundary with Uratta in the North, Umuguma in the west, Agbala in the east, and Ngor-Okpala in the south. Four hundred and ten (410) SS 2 students offering Chemistry

subject in the ten (10) government owned secondary schools in Owerri Municipal council area of Imo State were used as sample size. The instrument used for data collection was questionnaire. It consisted of two sections A and B. Section "A" comprises of the bio data, while Section "B" dealt with the questionnaire items proper. The instrument was validated by two experts, one from Chemistry department and the other from department of Research methods, Alvan Ikoku Federal College of Education, Owerri. Four hundred and ten (410) students completed the questionnaires and the data were subjected to mean statistics. The four (4) Likert scale type

was used and scored as follows: Not Difficult (ND), Slightly Difficult (SD), Difficult (D) and Very Difficult (VD) for the topics and Strongly Disagreed (SD), Disagreed (D), Agreed (A) and strongly Agreed (SA) for the causes of difficulty.

The level of difficulty of a particular topic was determined by the value of means as follows: Means less than 2.5 are said to be easy and the means above 2.5 are said to be difficult. To determine the causes of the perceived difficulties, the data collected were subjected to mean statistics and scores of the mean less than 2.5 were regarded as accepted and means above 2.5 were taken as rejected.

3. Results

3.1. Research Question 1

Question 1. What topic in the Senior Secondary Chemistry Syllabus do you perceive difficult?

S/N	Question	4	3	2	1	N	X	REMARK
		VD	D	SD	ND			
1	Particulate nature of matter	47	81	58	224	410	1.39	Easy
2	Symbols, Formulae & Equation	188	243	116	224	410	2.36	Easy
3	Chemical Combination	83	132	102	93	410	2.32	Easy
4	Gas laws	332	396	204	93	410	2.51	Difficult
5	Standard separating Techniques	84	95	101	130	410	2.4	Easy
6	Acid, Base & Salts	336	285	202	130	410	2.31	Easy
7	Water	97	102	102	109	410	2.2	Easy
8	Carbon & Its Compounds	388	302	204	109	410	2.29	Easy
9	Periodic Table	88	109	89	124	410	2.34	Easy
10	Chemical reaction	352	327	178	124	410	2.42	Easy
11	Mass volume Relationship	83	96	98	133	410	2.6	Difficult
12	Acid-Base Reaction	332	288	196	133	410	2.44	Easy
13	Hydrogen	78	85	91	156	410	2.29	Easy
14	Oxygen	312	255	182	156	410	2.29	Easy
15	Halogen	48	154	78	130	410	2.35	Easy
16	Nitrogen	192	462	156	130	410	2.37	Easy
17	Sulphur	85	105	87	133	410	2.05	Easy
18	Oxidation –reduction (redox) reaction	340	315	174	133	410	2.47	Easy
19	Ionic Theory	83	130	75	122	410	2.45	Easy
20	Electrolysis	332	390	150	122	410	2.23	Easy
21	Hydrocarbons	100	122	115	73	410	2.55	Difficult
22	Alkanols	400	366	230	73	410	2.5	Difficult
	Total	87	116	100	107	410	51.07	
	Grand Mean	348	348	200	107		2.32	

From the above data, the total mean is 51.07 while the grand mean is calculated to be 2.32. Based on the standard mean set as 2.5, the answer to the research question 1 is that the extent to which topics are perceived difficult by the SS 2 students is to a low extent.

3.2. Research Question 2

Question 2. What are the causes of difficulties you experienced in the senior secondary chemistry syllabus.

S/N	Questionnaire Items	4	3	2	1	N	X	REMARK
		SA	A	SD	D			
1	Chemistry syllabus is too wide	196	126	44	44	410	3.15	Accepted
		784	378	88	44			
2	Chemistry involves too many calculations	109	181	56	64	410	2.81	Accepted
		436	543	112	64			
3	It is difficult to understand chemical equations and arithmetic	133	125	80	72	410	2.77	Accepted
		532	375	160	72			
4	There are more failures in chemistry exams than passes	122	156	63	69	410	2.8	Accepted
		488	468	126	69			
5	I don't know where to work if I finish my course in chemistry	74	106	130	100	410	2.37	Rejected
		296	318	260	100			
6	The major employment for chemistry classroom teaching	74	116	130	100	410	2.44	Rejected
		296	348	260	100			
7	I am scared of chemistry practical	70	102	140	108	410	2.37	Rejected
		28	306	280	108			
8	Chemistry is too abstract due to the way the teacher teaches it	110	132	62	102	410	2.6	Accepted
		440	396	132	102			
9	My chemistry teacher lacks innovation, encouragement and resourcefulness	104	120	84	92	410	2.52	Accepted
		416	360	168	92			
10	My chemistry teacher does not use instructional materials while teaching	154	120	76	60	410	2.89	Accepted
		616	360	152	60			
11	Chemistry is too abstract because we have never seen most of the things being taught	190	132	60	28	410	3.18	Accepted
		760	396	120	28			
12	The chemistry laboratory is not well equipped.	142	118	104	46	410	2.86	Accepted
		568	354	208	46			
13	Student do not go on excursion or field trip	108	116	126	60	410	2.66	Accepted
		432	348	252	60			
14	I offer chemistry because my parents want me to do it	70	98	136	106	410	2.32	Rejected
		280	294	272	106			
15	Students are not exposed to practical often	116	98	126	70	410	2.63	Accepted
		464	294	252	70			
16	I was afraid of chemistry even before I started doing it because my friends said it is too difficult	106	114	130	60	410	2.64	Accepted
		424	342	260	60			
17	Males are more chemistry inclined than the females	96	92	102	120	410	2.4	Rejected
		384	276	204	120			
18	Chemistry is meant for the males not for the females	80	80	150	100	410	2.34	Rejected
		320	240	300	100			
19	I lack the basic concepts in chemistry because I schooled in public school	114	116	124	56	410	2.7	Accepted
		456	348	248	56			
20	I lack practical knowledge in chemistry due to lack of instruments in government schools	116	112	132	50	410	2.71	Accepted
		464	336	264	50			
Total							51.16	
Grand Mean							2.56	

The total mean is 51.16 while the grand mean is 2.56. From this value, the answer to the research question 2 is that the extent to the causes of difficulties by students in chemistry curriculum is to a high extent.

4. Discussion of Results

From the data collected, it was discovered that SS II students in Owerri Municipal council perceived some topics difficult. These topics are: Mass volume relationship, hydrocarbons, and alkanols. This finding is in agreement with those of Jimoh (2000), Agogo and Onda (2014) and Agwai

(2008) who in their separate studies reported that students usually perceive some senior secondary school chemistry concepts difficult to learn. This implies that students may not perform well in their final year examinations if the sources of difficulties are not removed. The study also revealed that there are some reasons why chemistry students find some concepts difficult to learn. These students are not often exposed to practicals, excursion/field trips, teachers do not take time in explaining the basic terminologies in Chemistry, lack of proper supervision by the teachers to students to know their area of difficulties makes the students have a *laissez-faire* attitude towards Chemistry.

According to Balogua (1989), students exposed to laboratory method are likely to perform well in Chemistry. It can be seen that the reverse is the case when students are not often exposed to laboratories.

From the research questions, it was found that chemistry syllabus is too wide, involving too many calculations and that chemistry is too abstract. This report is in agreement with Samba and Eriba (2012) in Agogo and Onda (2014), who reported in their study that students' poor performance in chemistry is due to the abstract nature of chemistry concepts. This implies that Chemistry curriculum should be looked into. The approach and processes used in the curriculum planning, development, design, implementation and evaluation determine the personal and social competence of the learner and the intended learning outcome. The respondents' blamed the students' poor performance in examinations on the teachers. They agreed that chemistry is too abstract due to the way the teacher teaches it, that chemistry teachers do not use instructional materials while teaching and do not expose them to practical works often. Takawira and Admire (2012), in their study on "Student Performance in A-level Chemistry Examinations in Makoni District, Zimbabwe", Teachers and students voiced concern about the extensive nature of the chemistry syllabus and the nature of examination questions and they felt that the abstract nature of chemistry was a major source of learning problems. Some students had misgivings about the way the subject was taught, lack of suitable text books and the very limited access to practical work, attitude of some teachers who failed to motivate students toward liking the subject, and the quality of teachers. Teaching is an interaction between the teacher and the learner, or the learner and other learners under the guidance of the teacher with the aim of achieving educational objectives. The main purpose of teaching is to teach the learner so that there will be a change in his behavior. The result of the study shows that teachers to a large extent are contributing factors to poor performance of Chemistry students in secondary schools. Research carried out by Uchegbu *et al*, 2015 revealed that some teachers who are not graduates of chemistry equally teach chemistry. And this is in line with the finding of Koebler (2011) who pointed out that roughly 30 percent of chemistry teachers in public high schools as well as those in our tertiary schools today did not major in these fields and have not earned professional certificates to teach the respective areas which they are handling. According to Agogo and Onda (2014), qualification of a teacher is of paramount importance to teaching and learning of difficult concepts in sciences. Qualified teachers should be employed to teach chemistry, who are expected to combine teaching experiences with their qualifications to effect teaching. Teachers who lack pedagogical content knowledge commonly paraphrase information in learners' textbooks or provide abstract explanations that are not meaningful to their students (Eggen&Kauchak, 2001) and how can such students perform well in their examinations.

The teacher of science and technology is the means through which the skills and knowledge get to the learners. 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 qualification (Agogo and Onda (2014). The qualification of the chemistry teacher however, will enable his/her to competently handle all concepts in chemistry. A teacher should consider the individuals differences of the students and vary his/her method of teaching. He should motivate the students. SSII students in Owerri Municipal Council agreed that the chemistry laboratories are not well equipped and that they do not go on field trips or excursions.

Chemistry is a practical oriented subjects, thus the theory and practical aspects of chemistry should go together. Students retain more what they have seen and touched than what they were told. And lack of adequate science equipment makes the study of chemistry un-interesting, difficult and even frustrating.

5. Conclusion

From the findings, it was discovered that students find some topics in Chemistry curriculum difficult and the factors that caused the perceived difficult topics in chemistry curriculum included insufficient qualified and practical oriented chemistry teachers, non-functional laboratories, teaching methods and non-use of instructional materials. Hence teachers should re-examine and evaluate their present teaching strategies, they should stop the use of abstract terms or concepts while teaching

Recommendation

From the findings however, it is recommended that:

1. Government should provide functional laboratories and other relevant instructional materials for the teaching and learning of Chemistry in our secondary school.
2. More qualified chemistry teachers who are practical oriented should be posted to the secondary schools to demystify the seemingly abstract concept and topics in chemistry.
3. Curriculum planners should look into the curriculum, make provisions for more practical works and illustrations of different concepts.

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