



Identification and analysis of learning difficulties in chemistry experienced by senior secondary school students in Awka education zone of Anambra State

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Abstract

The study identified and analyzed the learning difficulties experienced in chemistry by senior secondary two (SS2) students in Awka Education Zone of Anambra State. Five research questions guided the study and three null hypotheses were tested at 0.05 level of significance. The design of the study was descriptive survey. Purposive sampling technique was used to select a sample size 450 from a population of 4,206 Chemistry students in the study area. Chemistry Learning Difficulty Assessment Questionnaire (CLDAQ) was used to collect data on types of learning difficulties, factors responsible for learning difficulties and ways of overcoming learning difficulties in Chemistry. The CLDAQ was validated by three experts from Nnamdi Azikiwe University, Awka. The reliability coefficients of 0.81, 0.78, 0.87 and 0.71 were found for clusters A to D respectively and an overall reliability index of 0.79 using Cronbach Alpha formula. Mean and standard deviation were used to answer the research questions while two-way ANOVA was used to test the null hypotheses. The findings of the study revealed among others that chemistry students experience difficulty in mathematical aspect of chemistry which are dyscalculia difficulty and attention/concentration difficulty. However, there is significant difference between learning difficulties in chemistry experienced by male and female students; male students experience difficulty more than females among others. Based on the findings of the study, it was recommended among others that relevant authorities like curriculum planners, policy makers, Government, school administrators and Professional Association like STAN should organize seminars, conferences and workshops for pre-service and in-service teachers, and chemistry students from time to time in order to equip them with skills and strategies in teaching and learning of chemistry to reduce or eliminate these difficulties.

Keywords: learning, study identified and analyzed, chemistry experienced

Introduction

Education is recognised as the nation's greatest asset towards the quick development of its scientific potentials, sociological and human resources, hence it focuses on the integration of the individual into a sound and effective citizen. Education, particularly science education is an area needed for the production of the scientists who are required to turn the nation's economy around. The importance of education in general and science education in particular in national development cannot be overemphasized. Science education occupies a very high position in Nigeria educational policies.

The Federal Government of Nigeria (FRN, 2014) in the National Policy on Education places much emphasis on science education. This is because, the solutions to the problems and needs of our society centre on development of science and technology. This will help to usher in the desired technological advancement which is very much required for the elevation of Nigeria from a 'consumer nation' to a 'producer nation' and from a 'developing nation' to 'developed nation' (Avaa, 2007). Nigerian education system has three levels of education; basic, secondary and tertiary level.

At the secondary school level, science and technology are important aspect of the core curriculum with the major objective 'to equip students to live effectively in our age of science and technology'. Science and technology have therefore exerted and will continue to have significant impact on all facets of human endeavour. Within the context of science education is chemistry. Chemistry is one of the

basic sciences from onset and has been identified as a very important science subject. Its importance in scientific and technological development of any nation has been widely reported. Chemistry has been a pre-requisite subject for science oriented courses in the tertiary institution and this call for the need to teach it effectively.

Chemistry enables the students to understand what happens in the world they live in and how it contributes to the quality of life on our planet (Ware, 2009) ^[15]. Chemistry curriculum commonly incorporates many abstract concepts which are central to further learning in both chemistry and other sciences (Taber, 2006) ^[14]. According to Glazer (2005) ^[5], many students have a fundamental misunderstanding and experience learning difficulties regarding chemistry concepts. Glazer reported that this is as a result of some factors like teachers' feelings and attitudes about science, chemistry curriculum contents, overload of students' working memory spaces, language and communication concept formation, poor teaching styles, lack of motivation, lack of teaching aids. Hence, the author added that these leads to poor learning of chemistry concepts.

Learning is a process in which the learning activity constructs or builds new ideas or concepts or experience (Nwagbo and Obiekwe, 2010) ^[9]. In other words learning involves constructing one's own knowledge from one's own experiences. Learning is the process of gaining knowledge or skill by studying from experience being taught (Hornby, 2010) ^[6]. Learning chemistry requires much intellectual thought and discernment because the content is replete with abstract concepts are important because further chemistry or

science concepts cannot be easily understood if these underpinning concepts are not sufficiently grasped by the students (Nicoll, 2006) ^[8]. Chemistry by its very nature, is highly conceptual. While much can be acquired by rote learning, real understanding demands the bringing together of conceptual understandings in a meaningful way and when this is not done, it brings about learning difficulties.

Learning difficulties are mental problems that people may have from birth or that may be caused by illness or injury that affects their ability to learn things. According to Oyewole (2005) ^[11], learning difficulty is a classification that includes several areas of functioning, in which a person has difficulty learning in a typical manner usually caused by an unknown factor or factors. This is in line with the findings of Murray and Ganin (2011) ^[7], who asserted that learning difficulty is a way information is learned and processed. They maintained that learning difficulties are neurological (rather than psychological), usually run in families and occurs independently on intelligence. Learning difficulties can have significant impact on education, learning and on the acquisition of literacy skills. Some types of learning difficulties are dyslexia (reading disability), dysgraphia (writing disability), dyscalculia (mathematical disability), dyspraxia (sound making difficulty), working memory difficulty, visual processing difficulty, auditory processing difficulty, non-verbal difficulty and attention/concentration difficulty. Thus, the learning difficulties in chemistry could be as a result of its abstract concepts.

The abstract nature of chemistry along with the other content learning difficulties means that chemistry classes require a high level skill. That is why Science Teachers Association of Nigeria (STAN) is making efforts to provide the type of STEM (Science, Technology, Engineering and Mathematics) education that will ensure that they meet the challenges of 21st century knowledge based society. Moreover, many students believe that chemistry is difficult and could be as a result of its abstract nature. The perceived difficulties are part of the content in which these students develop chemical concepts and problem solving skills. However, what seems to be difficult for one person may not be perceived as being difficult by another person. Perception is one of the mental process or skills human beings engage in, it is a cognitive activity in learning which is seen as the process of reading senses out of something (Agogo, Ogbaba and Damkorikpa, 2013). The way a student perceives a subject could affect his/her performance in that subject.

There has been consistent decline in the performance of students in public examination conducted by the West African Examination Council (WAEC) and the National Examination Council (NECO) in chemistry across the country over the years (Samba and Eriba, 2012). Specifically, in Awka Education Zone of Anambra State, the performance of students in chemistry subject at the secondary school remains a dismal failure. However, it is disappointing to note that the students' performance in chemistry at internal and external examinations has remained considerably poor despite the relative importance of chemistry (Saage, 2009). WAEC also confirmed this decline in chemistry performance of the students from the WAEC Chief Examiner's reports from 2015 to 2022. An examination of studies on students learning of chemistry concept clearly demonstrates that most of the basic concepts were poorly learned and could be responsible for students'

poor performance in public examination. Available evidence indicate that students' achievement in chemistry, especially at the senior secondary school level worsen as years go by and many students seem to have negative attitude towards the subject.

The poor achievement of students in science especially chemistry in Awka Education Zone has continued to be a major concern to all and particularly those in the main stream of science education (Ariyo in Nworgu, Ugwuanyi and Nworgu, 2013) ^[10]. Eryilmaz in Nworgu *et al* (2013) ^[10] observed that gender contributes to poor achievement of students in chemistry. Gender according to Nworgu *et al* (2013) ^[10] refers to the social attributes and opportunities associated with being male or female and the relationships between women and men, girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes. Gender as well refers to the social meanings associated with being male or female, including the construction of industries, expectations, behaviours and power relationships that derive from social interactions (Ambe-Uva, Iwuchukwu and Jibrin, 2008). On the other hand, it is cultural or societal method of assigning attributes which differentiates males from females. Although research has been carried out in this regard, these research efforts have not produced any definite or clear picture on the direction of gender difference in performance in Chemistry or science as a whole.

The critical belief of biological theorists is that gender differences are natural and therefore unalterable (Olubunmi in Nworgu *et al*, 2013) ^[10]. It would be right and proper to treat boys and girls in school differently because their natural inclinations are different roles. However, where a school is situated says a lot about the achievement of students (Ma and Wilkins in Nworgu *et al*, 2013) ^[10]. According to Ezeudu in Nworgu *et al* (2013) ^[10], school location means urban-rural setting. The urban-rural influence is also expected in chemistry just like any other science subject because of the psychosocial influence it may have on the teachers and students resulting mainly from location. This may even dictate their academic achievement in science of which chemistry forms a part. Therefore the area in which school is located can affect the educational achievement of a student.

Many students at senior secondary school level shy away from chemistry classes. A few that patronize chemistry classes perform poorly both in internal and external examinations. The WAEC Chief Examiner's reports in chemistry for the year 2015 to 2018 indicated that there is persistent drop in the performance of candidates. Teachers and researchers have blamed this development on inability of students to correctly understand fundamental concepts of basic science at the basic level before proceeding to senior secondary school, inability to fill the gaps between students' prior knowledge and the content to be taught, poor organization of knowledge. This might be the reason why many secondary school students do experience learning difficulties persistently over the years and have caused students to develop poor understanding of chemistry concepts despite governments' effort to improve teaching and learning of chemistry in schools. The problem of this study is what are the difficulties which senior secondary school students in Awka Education Zone of Anambra State experience in their learning of chemistry?

Research Questions

The following research questions guided the study:

What are the learning difficulties in chemistry experienced by SS2 students in Awka Education Zone, Anambra State?

What are the learning difficulties in chemistry experienced by male and female senior secondary school chemistry students in Awka Education Zone, Anambra State?

What are the learning difficulties in chemistry experienced by senior secondary school students in urban and rural areas in Awka Education Zone, Anambra State?

What are the factors responsible for these learning difficulties experienced by senior secondary school students in Awka Education Zone, Anambra State?

How do teachers, in their day-to-day teaching, help students overcome these learning difficulties in Awka Education Zone, Anambra State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

There is no significant difference between the learning difficulties in chemistry experienced by male and female senior secondary school students in Awka Education Zone, Anambra State.

There is no significant difference between the learning difficulty in chemistry experienced by senior secondary school students in urban and rural locations in Awka Education Zone, Anambra State.

There is no interaction between gender and school location with respect to learning difficulties experienced in chemistry by senior secondary school students in Awka Education Zone, Anambra State.

Methods

The design used in this study is descriptive survey. Survey research design according to Nworgu (2015) is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. This design is considered appropriate and suitable for this study because it focuses on identifying secondary school students learning difficulties in chemistry and analyzing the data obtained from a group of Chemistry students considered to be representative of the entire population. The study was carried out in Awka Education Zone of Anambra State. The population of the study consist of all the senior secondary two (SS2) chemistry students in the 61 Government owned secondary schools in Awka Education Zone of Anambra State. The population of the chemistry students is 4,206;

1896 are boys and 2310 are girls. A sample size of 450 SS 2 chemistry students out of 4,206 was selected using multi-stage sampling procedure involving disproportionate stratified sampling, simple random sampling and purposive sampling techniques. The instrument for data collection is Chemistry Learning Difficulty Assessment Questionnaire (CLDAQ). The instrument for this study was validated by three experts. The reliability coefficients of 0.81, 0.78, 0.87 and 0.71 were found for clusters A, B, C and D respectively with an overall reliability index of 0.79. A total of 470 copies of questionnaire were administered through Direct Delivery Technique (DDT) by the researcher. The data collected was analyzed using mean and standard deviation to answer the research questions while t-test and two-way Analysis of Variance (ANOVA) were used to test the null hypotheses at 0.05 alpha level.

Results

Research Question 1: What are the learning difficulties in Chemistry experienced by Senior Secondary School chemistry students in Awka Education Zone, Anambra State?

Table 1: Learning Difficulties Experienced by SS2 Chemistry Students N = 450

S/N	Items	\bar{x}	SD	Decision
	Types of Learning Difficulties			
	Dysexlexia (Reading difficulties)	2.81	1.53	Disagreed
	Dysgraphia (writing difficulties)	2.36	1.26	Disagreed
	Dyscalculia (mathematical difficulty)	3.91	1.41	Agreed
	Working memory difficulty	2.54	1.41	Disagreed
	Visual processing difficulty	1.74	0.98	Disagreed
	Auditory processing difficulty	2.18	1.24	Disagreed
	Non-verbal learning difficulty	2.49	1.33	Disagreed
	Attention/Concentration difficulty	3.02	1.44	Agreed
	Total	2.63	1.49	Agreed

Data presented in Table 1 reveals that only items 3 and 8 which are dyscalculia (mathematical difficulty) and attention/concentration difficulty with mean scores of 3.91 and 3.02 respectively were agreed as learning difficulties experienced by SS2 chemistry students. Hence their mean scores ranges from 3.00 and above which is the median.

Research Question 2: What are the learning difficulties in Chemistry experienced by male and female Senior Secondary School chemistry students in Awka Education Zone, Anambra State?

Table 2: Learning Difficulties Experienced by Male and Female SS 2 Chemistry Students N = 450; Male = 222 Female = 228

S/N	Items	Male			Female		
		\bar{X}	SD	Decision	\bar{X}	SD	Decision
1.	Dysexlexia (Reading difficulties)	2.46	1.40	Disagreed	3.16	1.58	Agreed
2.	Dysgraphia (writing difficulties)	2.44	1.42	Disagreed	2.29	1.09	Disagreed
3.	Dyscalculia (mathematical difficulty)	3.67	1.02	Agreed	4.14	1.46	Agreed
4.	Working memory difficulty	2.58	1.35	Disagreed	2.51	1.46	Disagreed
5.	Visual processing difficulty	1.86	1.07	Disagreed	1.62	0.87	Disagreed
6.	Auditory processing difficulty	2.69	1.27	Disagreed	1.68	0.99	Disagreed
7.	Non-verbal learning difficulty	3.27	1.23	Agreed	1.74	0.92	Disagreed
8.	Attention/Concentration difficulty	2.86	1.49	Disagreed	3.18	1.37	Agreed
	Total	2.73	1.28		2.54	1.22	Agreed

The data in Table 2 reveals that only items 3 and 7 which are Dyscalculia (mathematical difficulty) and non-verbal learning difficulty with mean scores of 3.6712 and 3.2703 respectively are learning difficulties experienced by male SS 2 chemistry students while items 1, 3 and 8 which are Dyslexia, dyscalculia and attention/concentration difficulties with mean scores of 3.1379, 4.1360 and 3.1798

respectively were agreed as learning difficulties experienced by female SS 2 chemistry students. Hence their mean scores ranges from 3.0 and above which is the median.

Research Question 3: What are the learning difficulties in chemistry experienced by SS2 students in urban and rural areas in Awka Education Zone, Anambra State?

Table 3: Learning Difficulties in Chemistry Experienced by SS2 Senior Secondary School Students in Urban and Rural Areas N = 450

S/N	Items	Rural			Urban		
		\bar{x}	SD	Decision	\bar{x}	SD	Decision
	Dyslexia (Reading difficulties)	2.76	1.33	Disagreed	2.92	1.54	Disagreed
	Dysgraphia (writing difficulties)	2.59	1.29	Disagreed	2.03	1.05	Disagreed
	Dyscalculia (mathematical difficulty)	3.24	1.33	Agreed	4.07	1.50	Agreed
	Working memory difficulty	2.58	1.52	Disagreed	2.44	1.28	Disagreed
	Visual processing difficulty	1.97	1.01	Disagreed	1.73	0.84	Disagreed
	Auditory processing difficulty	2.94	1.30	Disagreed	1.62	0.74	Disagreed
	Non-verbal learning difficulty	3.02	1.40	Agreed	1.74	0.89	Disagreed
	Attention/Concentration difficulty	3.12	1.65	Agreed	3.62	1.45	Agreed
	Total	2.78	1.35		2.52	1.16	Agreed

Data from Table 3 reveals that items 11, 15 and 16 which are dyscalculia, non-verbal learning difficulty and attention/concentration difficulty with mean scores of 3.2387, 3.0180 and 3.1171 respectively are agreed as learning difficulties experienced by SS 2 chemistry students in rural areas while items 11 and 16 which are dyscalculia and attention/concentration difficulties with mean scores of 4.0746 and 3.6184 respectively are agreed as types of

learning difficulties experienced by SS 2 chemistry students in urban areas.

Research Question 4: What are the factors responsible for these learning difficulties in chemistry experienced by senior secondary school students in Awka Education Zone, Anambra State?

Table 4: Factors Responsible for Learning Difficulties in Chemistry Experienced by Senior Secondary School Students N = 450

S/N	Items	\bar{x}	SD	Decision
17.	Positive attitude of students towards chemistry	1.53	1.19	Disagreed
18.	Negative attitude of students towards chemistry	4.23	1.19	Agreed
19.	Misconception in chemistry	3.83	1.16	Agreed
20.	Broad curriculum content and syllables	3.98	1.11	Agreed
21.	Overload of students working space	4.27	1.21	Agreed
22.	Poor scientific language and communication	3.46	1.49	Agreed
23.	Lack of good and suitable textbooks	4.19	1.25	Agreed
24.	Unavailability of adequate laboratory equipment	3.13	1.53	Agreed
25.	Teachers qualification	3.86	1.33	Agreed
26.	Teachers year of experience	3.33	1.29	Agreed
27.	Unfilled prior leaning gaps	4.51	0.83	Agreed
28.	Poor organization of knowledge and communication	3.91	1.34	Agreed
29.	Poor motivation of students by teachers	3.81	1.42	Agreed
30.	Inability to answer question associated with each topic	3.90	1.36	Agreed
31.	Abstract nature of chemistry	2.95	1.54	Disagreed
32.	Poor experiment/Practical work	2.88	1.76	Disagreed
33.	Teachers teaching method	4.35	1.17	Agreed
34.	Some chemistry concepts are difficult concepts	3.67	1.38	Agreed
35.	Teachers skip some difficult concepts	4.11	1.35	Agreed
36.	Low number of class work assignment	3.04	1.76	Agreed
37.	No relation of prior knowledge to present knowledge	4.10	1.21	Agreed
38.	Fewer problems solving	3.50	1.40	Agreed
39.	Lack of continuous assessment	2.78	1.65	Disagreed
40.	Inability to use computer to teach chemistry	2.72	1.10	Disagreed
41.	Teachers centered teaching	3.52	1.51	Agreed
42.	Non explanation of scientific language	4.08	1.33	Agreed
43.	Noisy environment	3.52	1.67	Agreed
44.	Long journey to school	2.24	1.45	Disagreed
	Total	3.55	1.36	Agreed

Data from Table 4 reveals that items 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 33, 34, 35, 36, 37, 38, 41, 42 and 43 are agreed as factors responsible for learning difficulty in chemistry experienced by senior secondary school students since their mean scores range from 3.00 and above while items 17, 31, 32, 39, 40 and 44 are disagreed as factors responsible for learning difficulties experienced by senior

secondary school students since their mean scores are below 3.00.

Research Question 5: How do teachers in their day-to-day teaching help students overcome these learning difficulties in Awka Education Zone, Anambra State?

Table 5: Ways of Overcoming Learning Difficulties Identified by Senior Secondary School Students in Chemistry N = 450

S/N	Items	\bar{x}	SD	Decision
	Ways of overcoming learning difficulties			
	Take scientific language into account	4.39	0.87	Agreed
	Take students anxiety into account	3.70	1.20	Agreed
	Helping students succeed on assignment and examination positively	4.06	1.31	Agreed
	Motivating students	4.69	0.92	Agreed
	Promote group working discussion	4.51	0.69	Agreed
	Put more time to mathematical topics	4.02	0.98	Agreed
	Reduce course content	2.87	1.52	Disagreed
	Use student centered teaching method	4.58	0.84	Agreed
	Promoting conceptual understanding	4.60	0.55	Agreed
	More attention to confused concept	4.77	0.59	Agreed
	Making links to everyday life	4.76	.43	Agreed
	More problem solving	4.60	.67	Agreed
	Use simple to complex method	4.83	.41	Agreed
	Creating good learning environment	4.79	.40	Agreed
	Engage students on more activities more efficiently	4.29	1.10	Agreed
	Allow students to use laboratory more efficiently	4.45	.86	Agreed
	Formulating effective method of assessment	3.74	1.29	Agreed
	Teaching students to finish in any examination	4.34	1.01	Agreed
	Transforming class test into teaching and learning tools	4.36	.99	Agreed
	Extra lesson hours should be arranged	3.72	1.15	Agreed
	Make abstract concepts more concrete	4.34	.95	Agreed
	Improve laboratory resources	4.50	.65	Agreed
	Encourage less crowded classes	4.42	.66	Agreed
	Total	4.31	0.87	Agreed

The data from Table 5 reveals that all the items were agreed as ways of overcoming learning difficulties in chemistry by students since their mean scores range from 3.0 and above except for item 51 with mean score of 2.8711 which is below the median score was disagreed as one of the ways of overcoming learning difficulties.

Null Hypotheses

Hypothesis 1: There is no significant difference between the learning difficulties in chemistry experienced by male and female senior secondary school students in Awka Education Zone, Anambra State.

Table 6: Summary of Two-way Analysis of Variance (ANOVA) of Students' Learning Difficulties by Gender and School Location. Dependent variable: Learning difficulty

Source	Type III Sum of Squares	DF	Mean Squares	F	Sig.	Dec.
Corrected Model	667.50 ^a	3	222.50	4.106	.007	S
Intercept	121770.45	1	121770.45	2247.070	.000	S
Gender	576.23	1	576.23	10.63	.001	S
Location	158.68	1	158.68	2.928	0.088	NS
Gender*location	292.43	1	292.43	5.396	0.21	S
Error	24169.08	446	54.19			
Total	224675.00	450				
Corrected Total	24836.58	449				

Decision Rule: Reject the null hypothesis if $p \leq 0.05$.

The analysis in Table 6 indicates that there is significant difference in gender with probability value of 0.001 which is less than stipulated 0.05 level of significance ($p < 0.05$). Following the decision rule, the null hypothesis which states that there is no significant difference in learning difficulties experienced by male and female senior secondary school students is therefore rejected.

Hypothesis 2: There is no significant difference in learning difficulty in chemistry experienced by senior secondary school students in urban and rural locations in Awka Education Zone, Anambra State.

Data on table 6 indicates that there is no significant difference in location with probability value .088 which is higher than stipulated 0.05 level of significant ($p > 0.05$). Following the decision rule, the null hypothesis which states that there is no significant difference on learning difficulties in chemistry experienced by senior secondary school students in urban and rural areas is therefore not rejected.

Hypothesis 3: There is no interaction between gender and school location with respect to learning difficulties experienced in chemistry by senior secondary school students in Awka Education Zone, Anambra State.

Data on table 6 also indicates that there is interaction effect between gender and school location with respect to learning difficulties experienced in chemistry by SS 2 senior secondary school students with probability value of .021 which is less than the stipulated 0.05 level of significance

($p < 0.05$). Following the decision rule, the null hypothesis which states that there is no interaction between gender and school location with respect to learning difficulties experienced in chemistry by senior secondary school students is therefore rejected.

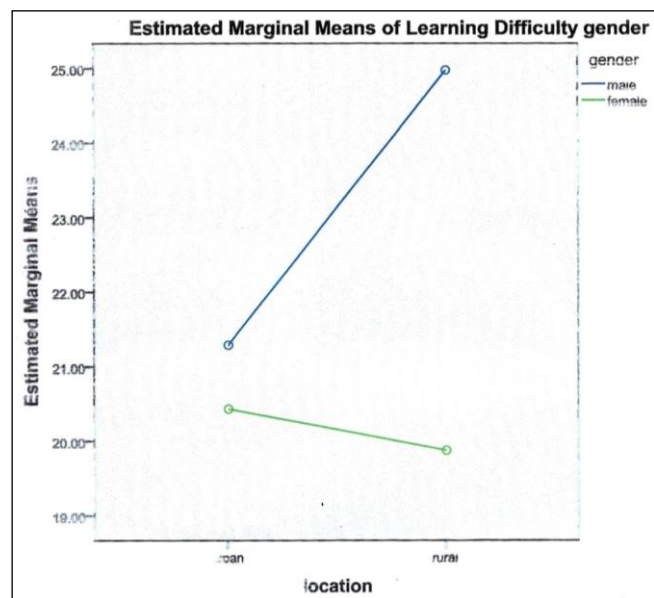


Fig 1: Graph of interaction between gender and school location

Figure 2 shows graph of interaction between gender and school location as regard to learning difficulties experienced in chemistry by senior secondary school students. Thus under gender comparison, male students in rural area experience more learning difficulties in chemistry with high estimated marginal mean score of 25.00 than male student in urban area with estimated marginal mean score of 21.20. Also female students in urban area experience more learning difficulties with estimated mean score of 20.30 than female in rural area who experience learning difficulties with estimated marginal mean score of 19.70.

Under location comparison, in urban areas, male students experience more learning difficulty (with estimated marginal mean score of 21.20) than female counterpart (with estimated marginal mean score of 20.30). on the other hand, in rural area, male students experience more learning difficulty (with estimated mean score of 25.00) than female students (with estimated mean score of 19.70).

However, it is clearly shown from the graph of figure 2 that, there is interaction effect between gender and school location on learning difficulties experienced among senior secondary school students in chemistry since male (both in rural and urban area) experience more learning difficulty (with their estimated marginal mean score ranging from 21.20 to 25.00) than female counterpart (both in rural and urban with their estimated margin mean scores ranging from 19.20 to 20.30).

Conclusion

Based on the findings and discussions of this study, it is concluded that dyscalculia (mathematical difficulty) and attention/concentration difficulties are the major learning difficulties experienced by senior secondary school students in chemistry. Many factors were found to be responsible for the learning difficulties experienced by students which are environmental related, some are course related, some are

staff related and students related. However, the difficulties students experience in learning of chemistry is influenced by gender not school location.

Recommendations

Sequel to the findings and conclusion of the study, the following recommendations are made:

1. Relevant authorities like Science Teachers Association of Nigeria (STAN), curriculum planners and policy makers should organize seminars, conferences and workshop for pre-service and in-service teachers and chemistry students to equip them with skills and strategies in teaching and learning of chemistry which will boost students' interest, concentration and positive attitude towards chemistry.
2. Chemistry teachers should as a matter of fact introduce the mathematical aspect of chemistry at the early stage and even on daily bases as students' progress from one class to another to minimize the mathematical difficulty.
3. Chemistry teachers should always use appropriate scientific language, sometimes make use of mother tongue to communicate what they want to explain to students with the use of visible and local instructional materials. This will make the subject look more concrete and interesting to students thereby reducing concentration/ attention difficulty.
4. Government and school administrators should encourage the chemistry teachers to involve themselves in WAEC and NECO marking exercise to master the tips involved in teaching, learning, answering questions and marking as well so as to bring them to the knowledge of students while teaching them in normal classroom setting.
5. Teachers should embrace students' centered with individualized teaching and learning approaches while in the class so as to reach students one and one to fish out their problems independently and as well find solutions to their problem, individually as this help them to master the subject without fear and for retention of knowledge.

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