

Correlates of Teachers and Students' Reasons for Content Difficulties in Senior Secondary School Chemistry Syllabus

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Abstract: *The reasons for chemistry topic difficulty as perceived by chemistry teachers and students in senior secondary schools in Ekiti state Nigeria was investigated. Descriptive Research Survey design was used for the study. Twenty senior secondary schools were purposively selected from five randomly sampled local Government area of Ekiti State. Fifty (50) chemistry teachers and four hundred and eighty chemistry students constituted the sample for the study. A seven item questionnaire of observed reasons by researchers and West African Examination Council Report of 1990 constituted the items for the instrument ranked with a four point likert scale. Four research questions with five corresponding hypothesis were raised and analyzed using percentages and t-test analysis technique. The results revealed that both teachers and students opine that poor mathematical skill (PMS) was the most prominent reason for observed chemistry difficulty among senior secondary school students in Ekiti state. Teachers and students' gender has no influence on their observed reasons for chemistry difficulty. The results further showed that school location has influence on students' observed reasons for chemistry difficulty. Based on the result of this study, it was recommended among others that chemistry teachers should be sensitized to retrain and be- retrained. Government should give teacher education programmes new methods and new approaches.*

Keywords: Correlate reasons, difficulty, senior secondary school, gender, location and Experience.

1. Introduction

The task of teaching students chemistry concepts meaningfully is sometimes rather complicated and so is too very often not fulfilled resulting in poor performance in the subject. Chemistry is one of the most important branches of science; it enables learners to understand what happened around them. The subject has influenced the world in all facets of life, ranging from individuals, food and chemical production down to the environment. Despite the importance of the subject, several researchers have observed poor performance and difficulty in chemistry as opined by [6], [3] and [14]. The above is supported by [16] that despite all the changes in the content and teaching of chemistry concepts, the subject remains one of the most conceptually difficult one for secondary school students. Because chemistry topics are generally related to or based on the structure of matter, chemistry proves a difficult subject for many students.

Researchers' reports have gathered evidences in a variety of topics which support the view that secondary school students have difficulties in solving stoichiometric problems, because they lack understanding of the basic concepts relating to stoichiometric calculations as stated by [17]. While some researchers are of the view that a deep consideration and understanding of chemistry objectives at the secondary school level will determine the level of effective teaching of the subject. These objectives they say will further determine the teachers' selection of teaching contents, teaching strategies, classroom interaction styles and necessary resources for subject matter delivery. The above will equally bring about/enhance learning and better output by the students [5] and [14].

Studies on cognitive relationship between academic performance in chemistry and mathematics achievement by chemistry students in Ekiti state by [8] revealed high and linear correlation between chemistry and mathematics achievement by chemistry students. This is in line with the [18] and [19] on candidates' performance in the West

African Examination Council (WAEC), which noted that many candidates avoided questions involving electrolysis, calculations and those who attempt the questions recorded low marks.

The need to investigate gender influence on perceived reasons for chemistry content difficulty is necessitated by the findings of [12] who stated that basic education for women will enhance their decision making. Gender according to [10] is a social construct that distinguishes the male and female species, but it will surprise you that both teachers and students experience difficulties in senior secondary school chemistry curriculum as opined by [4]. It is therefore paramount and necessary to investigate the reasons/causes for such perceived difficulties. The study seeks to ascertain teachers and students' reasons for chemistry content difficulty and the extent to which teachers' gender, years of teaching experience, students' gender and school location influence their reasons for observed chemistry content difficulty.

2. Research Questions

Will teachers and students give the same reasons for chemistry content difficulty?
 Will teachers and students' gender influence their observed reasons for chemistry content difficulty?
 What influence will school location have on students' reasons for chemistry content difficulty?
 What influence will teachers' years of teaching experience have on their observed reasons for chemistry content difficulty?

3. Research Hypotheses

The under mentioned null hypotheses were formulated and tested at $P < 0.05$.

HO1: There is no significant difference in chemistry teachers and students' observed reasons for chemistry content difficulty.

HO2: There is no significant difference in the observed reasons for chemistry content difficulty by male and female teachers.

HO3: There is no significant difference in the observed reasons for chemistry content difficulty by male chemistry students and their female counterparts.

HO4: There is no significant difference in the observed reasons for chemistry content difficulty by chemistry students in schools in urban and rural locations.

HO5: There is no significant difference in the observed reasons for chemistry content difficulty by experienced chemistry teachers and their counterparts who are inexperienced.

4. Methodology

The study is a survey research type. The design describes population characteristics by selection of unbiased sample. The data collected were used for the purpose of describing and interpreting existing conditions as they concern secondary school chemistry teachers and senior secondary school class three (3) chemistry students in Ekiti state. The population consists of all the chemistry teachers and SS3 chemistry students in Ekiti State. Samples of 50 chemistry teachers were selected using purposive sampling technique in order to take care of schools offering chemistry at senior secondary school class 3. While 480 chemistry students were randomly sampled from ten secondary schools in five Local Government areas of Ekiti State. The instruments used for the study include questionnaire for chemistry teachers (QCT) and questionnaire for chemistry students (QCS). A four point likert scale instrument consisting of seven reasons identified by several researchers [18], [7], [8], [13] and [4] that account for topic difficulty in science subjects. To establish the reliability coefficient, Pearson product moment was used to calculate the reliability of the pilot study and r value was calculated to be 0.83 which was found to be significant at 0.05 levels. The data were analyzed using percentages and t-test.

5. Results and Discussion

Table 1: Ranked Teachers' Reasons in descending mean.

Teachers Reasons	Frequency	Percentage %
Poor Mathematical Skill (PMS)	43	86.00
Lack of Practical Activities (LPA)	33	66.00
Low Commitment (LC)	26	52.00
Abstract Nature (AN)	25	50.00
Misconception of Content (MC)	22	44.00
Poor Teaching Method (PTM)	21	42.00
Lack of Interest (LI)	18	36.00

Teachers in sampled schools revealed that poor mathematical skill (PMS) having 43 (86%) was the most prominent reason for observed chemistry difficulty among chemistry students in Ekiti State. The 33 teachers representing 66% of the sampled teachers further opined that lack of practical activities (LPA) account for students' difficulty in chemistry. Lack of interest by students was ranked the lowest reason for chemistry difficulty by teachers.

Table 2: Ranked Students' Reasons in descending mean

Students' Reasons	Frequency	Percentage %
Poor Mathematical Skill (PMS)	432	90.00
Misconception of Content (MC)	412	85.83
Low Practical Activities (LPA)	346	72.08
Poor Teaching Method (PTM)	306	63.75
Lack of Interest (LI)	256	53.33
Abstract Nature (AN)	186	38.75
Low Commitment (LC)	124	25.83

90% of the sampled students opine that poor mathematical skills were the most prevailing reason for their observed difficulty in chemistry. While misconception of content had 412 (85.83%) students support, low commitment was ranked least.

Table 3: Comparative teachers (trs) and students' (stds) reasons for difficulty

Reasons	No of trs	% of trs	No of stds	% of stds
Poor Mathematical Skill (PMS)	43	86.00	432	90.00
Lack of Practical Activities (LPA)	33	66.00	346	72.08
Low Commitment (LC)	26	52.00	124	25.83
Abstract Nature (AN)	25	50.00	186	38.75
Misconception of Content (MC)	22	44.00	412	85.83
Poor Teaching Method (PTM)	21	42.00	306	63.75
Lack of Interest (LI)	18	36.00	256	53.33

Tables 3 showed that both teachers and students observed that poor mathematical skills (PMS) and low practical activities (LPA) account for observed difficulty in chemistry content. While teachers rated lack of Interest lowest, students on the other hand opine low commitment as the least reason for chemistry difficulty.

Table 4: Teachers gender and observed reasons

Gender	N	mean	SD	df	t _{cal}	t _{tab}
Male Teachers	25	13.45	15.63			
Female Teachers	25	9.78	9.34	48	0.99	2.01

Teacher's gender has no influence on their observed reasons for chemistry difficulty

Table 5: Student's gender and reasons for difficulty

Reasons	No male	% male	No female	% female
PMS	220	91.67	212	44.17
MC	238	99.17	174	72.50
LPA	206	85.83	140	58.33
PTM	108	45.00	198	82.50
LI	78	32.50	178	74.16
AN	70	29.17	116	48.33
LC	78	32.50	46	19.17

Higher percentage of the male students ranked misconception of content as the most paramount reason for chemistry content difficulty. While the females are of the opinion that poor teaching method account for content difficulty in chemistry.

Table 6: t-table of students' gender and observed reasons

Gender	N	mean	SD	df	t _{cal}	t _{tab}
Male students	240	23.45	25.63			
Female students	240	9.78	18.34	478	1.87	1.96

From the table 6, gender has no significant influence on students' observed reasons for chemistry content difficulty. This means that both male and female students view the same reasons to account for the difficulty experienced by students in chemistry content in senior secondary school curriculum.

Table 7: School location and students reasons for chemistry difficulty

Categories	N	mean	SD	df	t _{cal}	t _{tab}
Urban	240	16.78	17.34			
Rural	240	13.34	12.68	478	2.02	1.96

Table 7 shows that school location has significant influence on students proposed reasons for chemistry difficulty. Students in schools located in urban setting opine more reasons for chemistry difficulty.

Table 8: Teaching experience and observed reasons for difficulty

Categories	N	mean	SD	df	t _{cal}	t _{tab}
Experienced Teachers	28	11.55	13.65			
Inexperienced Teachers	22	8.98	8.62	48	0.77	2.01

Teaching experience has no significant influence on teachers observed reasons for chemistry topics difficulty. This shows that the length of years of teaching the subject does not have influence on teachers observed reasons for chemistry difficulty.

6. Discussion

The results of the study revealed that both teachers and students ranked poor mathematical skill [PMS 431(86.00%) and 432(90%)] as the most prevalent reason for students observed chemistry content difficulty. This finding was in support of [15], [2], [9] and [11] who proved that some mathematical concepts were found difficult to teach by teachers. Such difficulty by teachers would result in lack of application by students to chemistry concepts hence misconception would arise by students. The finding of the study revealed further that both teachers and student's gender ($t_{cal} 0.99 < t_{tab} 1.96$ and $t_{cal} 1.87 < t_{tab} 1.96$) has not significant influence on their observed reasons for chemistry content difficulty. This is contrary to the opinion of [1] that male students have higher retention ability and as such perform better in science than their female counterpart. It is therefore expected that male students ought not to have difficulty in chemistry content at all. School location has significant influence on senior secondary school student's observed reasons for chemistry content difficulty. ($t_{cal} 2.02 > t_{tab} 1.96$). Students in urban setting opine greater reasons for chemistry content difficulty. Whereas teachers long years of teaching did not influence their observed reasons for content difficult. This support the finding of [13] that set objectives of teachers will determine the level of knowledge/service delivering.

7. Conclusion

This research contributed to the broad understanding of the connectedness of observable traits: gender, experience and school location on reasons for chemistry content difficulty by students and teachers. The data have provided evidence has shown that teachers and students mathematical skill account for difficulty in chemistry content. Other variables identified to influence student's observed reasons for content difficulty include school location. Effort should not only concentrated on paper qualification but teacher's attitude, interest and job satisfaction should be considered. Government should make frantic effort on rural schools by providing necessary facilities and teachers should be encourage in order to improved students level of performance and reduce content difficulty.

8. Recommendation

On the basis of these research findings, the following recommendations need to be practiced and implemented as soon as possible.

In order to help students develop scientific skills during chemistry lessons and for the teachers to teach meaningfully, the author recommends that chemistry teachers should be sensitized to retrain and be retrained. Teachers should create more time for mathematical concepts on the school time table to enhance students understanding and interest.

Teachers should also attempt research work that will enhance solutions to teaching problems. Government should give teacher education programmes new methods and new approaches. Federal, State and local Government in Nigeria should encourage teacher and student study chemistry by the awards of scholarship, sponsorship to workshops, similar, conferences and better monthly salaries.

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