

Challenges Encountered by Senior Secondary School II Students in Practical Chemistry

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Abstract

This study examined the challenges encountered by senior secondary school II students in Chemistry practical in Aguata LGA Anambra State. The study was guided with three research questions and their hypotheses. The design of the study was a descriptive survey. A sample of 96 Chemistry students was drawn from a population of 960 senior secondary school II chemistry students in the LGA using multi-staged sampling technique. The instrument for data collection was a 21-item researcher developed questionnaire titled: Students' Challenges in Practical Chemistry Questionnaire (SCPCQ) with four-point rating scale of strongly Agree (SA), Agree (A), Disagree (D), and strongly Disagree (SD). The face validation of the instrument was carried out and reliability of 0.88 coefficients obtained using Cronbach Alpha formula. Data collected were analysed with mean and standard deviation to answer the three research questions and t-test used to test the hypotheses at 0.05 level of significance. The findings revealed among others that some of the students related challenges encountered by students during practical chemistry were stealing materials for practical and lateness for practical classes, while the use of unqualified teachers to conduct practical as well as poor funding and allotment of less periods for practical exercises among others are the teachers and administrative related challenges respectively. Based on the findings, it was recommended that government should provide the needed infrastructures as well as motivate teachers in their remuneration for effective conduct of practical in schools.

Keyword: Challenges, Laboratory, encountered, students, Chemistry practical, Administration

Introduction

Chemistry is the science that methodically analyzes the composition, characteristics and activity of organic and inorganic substances and the numerous elementary forms of matter. It lies at the heart of understanding ordinary life and processes. Because it offers a framework for comprehending both fundamental and applied scientific fields at a fundamental level, chemistry is frequently referred to as the center science. It has significant and leading roles in driving industrialization, advancing national prosperity, and leading technological developments. According to Apuh (2020), chemistry is therefore used in many specialized fields, including medical, pharmacy, food production, environmental protection, chemical engineering, the paper industry, and more. It is important to make chemistry applicable to our homes, surroundings, and potential careers (Diovu, 2016).

At the post-primary senior School level, students are first introduced to the topic of chemistry.

The following goals are anticipated to be met by the chemistry curriculum: Help students become interested in chemistry, allow them to learn the fundamentals of theory and practice, encourage them to become interested in science, technology, and mathematics (STM) and to learn about it, give them the tools to use their skills to meet the needs of society by creating jobs and wealth, put them in a position to take advantage of the many career opportunities that chemistry offers, and, finally, encourage them to properly prepare for further chemistry studies. If theoretical explanations of chemistry concepts and principles are linked with lab practices, the educational goals of chemistry education can be fully achieved (Shah & Sharma, 2015).

Laboratory practical should be utilized as a learning resource, it gives students opportunity to observe chemical systems, gather useful data for the development of principles subsequently discussed in textbooks and in the class (Iyamuremye, Nsabayezyu,

Ngendabanga, & Hagenimana, 2023). Prabha (2016) argued that performing experiments with a spirit of inquiry and critical thinking can lead students to a more meaningful understanding of the subject. Chemistry is practical in nature and Psychologists found that learning by doing is the most effective method for teaching and learning chemistry in schools. Research in chemistry has continued to seek better approaches for teaching practical chemistry, tackle challenges encountered by secondary school students in Chemistry practical and identify factors responsible for poor performance of students in practical Chemistry exams.

Challenge is a common factor in life experienced by everyone. Students in Senior Secondary especially those who offer Chemistry are required to develop a hands-on and minds-on skill in-order to gain the required basic practical skill necessary for their class (Negesse & Shitaw 2021) and face challenges inherent in the Subject. Those Challenges encountered by students in Chemistry/Chemistry practical lesson can be three folds, namely: Teachers related challenges, Students related challenges and School Administration related challenges.

Teachers related Challenges are those challenges students encounter in practical chemistry which teachers are responsible for. Prabha (2016) observed that poor performance of students in Chemistry practical could be linked to teachers not having the required skills, time, interest and knowledge for practical work, teachers have less time to plan for practical because they have some other job commitments, some teachers come late for the practical classes. Negesse & Shitaw (2021) noted that some teachers lack interest in teaching practical Chemistry, which in turn will affect the student's interest in chemistry practical. Iyamuremye *et.al* (2023) is of the opinion that a well-equipped laboratory and best science curriculum will serve little unless the teacher's role of helping chemistry students achieve the objective of practical work is fulfilled. Namely, arousing inquisitiveness and appreciating the nature of science. Challenges students encounter in practical chemistry can be caused by them. Most of them perceive Chemistry as a difficult subject which particularly affects their understanding of the subject. They don't pay attention during chemistry practical lesson. They are absent and those who come are late making it difficult for the teacher to meet up with the curriculum.

Other Challenges are caused by lapses on the side of the school Administration. It is a challenge for students if the school administration does not have what

it takes to fund, and employ competent personnel to handle practical sessions. For effective chemistry practical lessons, laboratories must be properly equipped, materials, and chemicals provided. Iyamuremye *et.al* (2023) commented that inadequate laboratory materials and equipments, shortage of funds, overloaded school time table, overcrowded classrooms are notable challenges school administration should consider. Poor conducive laboratory environment and inadequate provision of water and light hampers the teaching of Chemistry practical. Lastly, examination system or administrators does not place emphasis on practical skills. Hence, it is important to explore the underlying difficulties that might impede quality Practical teaching and learning of the subject Chemistry.

It is against this background that the researcher seeks to identify problems encountered by senior Secondary School II Students in Chemistry practical in Aguata Local Government Area.

Research Questions

Three research questions guided the study:

1. What are the students' related challenges encountered by secondary school II students in practical chemistry?
2. What are the Teachers' related challenges encountered senior secondary school II students in practical chemistry?
3. What are the Administrative-related challenges encountered by secondary school II students in practical chemistry?

Hypotheses

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

1. There is no significant difference between the mean ratings of male and female students on the Students' related challenges encountered by secondary school students in practical chemistry
2. There is no significant difference between the mean ratings of male and female students on the teachers' related challenges encountered by Secondary School students in Practical Chemistry
3. There is no significant difference between the mean ratings of male and female students on the Administrative-related challenges encountered by secondary school students in practical chemistry.

Methods

This study adopted a descriptive survey research design. The sample size for the study was 96 students (57 males and 39 females) drawn from the population of 960 Secondary School II Chemistry students in Aguata Local Government Area using multi staged sampling technique. At first purposive sampling technique was used to sample two coeducational schools to take care of the gender variable in the study. Secondly, simple random sampling technique was used to sample stream of SSII class used for the study. With total number of 96 students which formed the sample of the study. Data was collected with a researcher structured questionnaire titled Students Challenges in Chemistry Practical Questionnaire (SCCPQ). The

instrument was developed based on four likert scale of strongly agree, agree, disagree and strongly disagree. Three clusters were used. Each cluster addresses one research question. The instrument was validated by three experts, it was analysed using cronbach alpha statistics and found reliable at 0.88 co-efficient. Data collected was analysed with mean and standard deviation which answered the research questions while the t-test was used to test null hypothesis at 0.05 significant level. Any mean equal to or above 2.50 was accepted while those below 2.50 were rejected. If the calculated t-value is greater than the t-critical the null hypothesis was rejected but if otherwise the hypothesis was accepted.

Results

The results of the analyses were presented in the tables and as follow:

Table 1: Mean and Standard deviation of Male and Female Students on Students'-related Challenges encountered by senior secondary school II students in practical chemistry.

S/N	Students related challenges	Male			Female		
		X	SD	Remark	X	SD	Remark
1	Inability to obey rules and regulations guiding the use of laboratory and practical	2.62	0.78	Agreed	2.88	0.90	Agreed
2	Stealing practical equipment and specimens.	3.06	0.69	Agreed	3.12	0.89	Agreed
3	Inability to corporate well with the practical teachers	2.65	0.75	Agreed	2.59	0.94	Agreed
4	Absenteeism and truancy during practical lessons	2.72	0.77	Agreed	3.21	0.79	Agreed
5	Careless handling of practical materials and equipment	3.10	0.95	Agreed	3.16	0.93	Agreed
6	Paying less attention and interest to practical lessons	3.05	0.79	Agreed	3.03	0.89	Agreed
7	Inability to provide the needed improvised specimens for practical	2.75	0.85	Agreed	2.83	0.73	Agreed
	Cluster Mean	2.85	0.80	Agreed	2.97	0.87	Agreed

Table 1 show that the mean of male and female students in all the items (1-7) ranged between 2.59-3.21 and were all above the mean benchmark of 2.50.

Therefore, all items are the students-related challenges encountered by senior secondary school II students in practical chemistry.

Table 2: Mean and Standard deviation of Male and Female Students on Teachers' related Challenges encountered by senior secondary school II students in practical Chemistry

S/N	Teachers' related challenges	X	Male		X	Female	
			SD	Remark		SD	Remark
8.	Usage of unqualified teachers to conduct chemistry practical	2.68	0.88	Agreed	2.98	0.83	Agreed
9	Teachers' lateness to practical classes.	3.01	0.79	Agreed	2.82	0.80	Agreed
10	Teachers lack of adequate preparation before chemistry practical	3.11	0.75	Agreed	3.02	0.98	Agreed
11	Teachers lack of adequate skills to conduct practical	2.82	0.78	Agreed	2.67	0.77	Agreed
12	Teachers attitude to students during practical	2.90	0.86	Agreed	2.96	0.91	Agreed
13	Teachers' gender hinders smooth conducts of chemistry practical.	2.45	0.69	Disagreed	2.33	0.85	Disagreed
14	Teachers' skip and selection of some topics for practical.	3.05	0.95	Agreed	3.13	0.74	Agreed
15.	Teachers rush during practical classes to cover the curriculum	3.02	0.77	Agreed	2.81	0.85	Agreed
	Cluster mean	2.88	0.81	Agreed	2.84	0.84	Agreed

Table 2 reveals the mean of the male and female students in all the items except item 13 ranged between 2.67-3.13 and were all above the mean benchmark of 2.50. This indicates that the respondents agreed on those item statements as the teachers-related challenges encountered by secondary school students in practical chemistry. On the other hand Item 13 had

mean for male and female students as 2.45 and 2.33 respectively and were below the mean benchmark of 2.50 indicating that Teachers' gender hinders smooth conducts of chemistry practical is not a challenge encountered by secondary school students in practical chemistry.

Table 3: Mean and Standard deviation of Male and Female Students on Administrative- related challenges encountered by senior secondary school II students in practical chemistry

S/N	Administrative- related challenges	X	Male		X	Female	
			SD	Remark		SD	Remark
16	Schools' non-supply of equipment and specimen for practical	3.04	0.98	Agreed	3.15	0.70	Agreed
17	Schools recruitment of unqualified chemistry teachers for practical.	2.90	0.60	Agreed	2.65	0.82	Agreed
18	Allotment of less periods for practical classes	2.67	0.70	Agreed	2.79	0.64	Agreed
19	Lack of laboratories for chemistry practical	2.72	0.76	Agreed	2.78	0.77	Agreed
20	Non-provision of protective gadgets to avoid incidents of hazards for students and teachers	2.67	0.77	Agreed	2.66	0.73	Agreed
21	Poor motivation of teachers that conduct practical to students	2.86	0.73	Agreed	2.73	0.89	Agreed
	Cluster mean	2.81	0.76		2.79	0.76	Agreed

Table 3 show that the mean of male and female students in all the items (16-21) ranged between 2.65-3.15 and were all above the mean benchmark of 2.50.

This indicates that the items listed are administrative-related challenges encountered by secondary school students in practical chemistry.

Table 4: Result of t-test analysis of responses on significant difference between the opinion of the male and female students on the teachers' related Challenges encountered by secondary school students in Practical Chemistry

Status	N	X	Sd	df	t-cal.	t-crit.	Remark
Male	57	2.85	0.80	94	-0.69	1.96	NS
Female	39	2.97	0.87				

In Table 4, the t-calculated value is -0.69 and the t-critical value is 1.96. Since the t-calculated value of -0.69 is less than t-critical value of 1.96, the hypotheses of no significant difference was not

rejected. Therefore, there is no significant difference between the opinion of male and female students on the teachers' related challenges encountered by secondary school students in practical chemistry.

Table 5: Result of t-test analysis on significant difference between the opinion students on the Students' related Challenges encountered by secondary school students in Practical Chemistry

Status	N	X	Sd	df	t-cal.	t-crit.	Remark
Male	57	2.88	0.81	94	0.23	1.96	NS
Female	39	2.84	0.84				

In Table 5, the t-calculated and the t-critical is 0.23 and 1.96 respectively, showing t-calculated is less than t-critical. The hypothesis of no significant difference was not rejected. Therefore, there is no

significant difference between the mean opinion of male and female students on the students' related challenges encountered by secondary school students in practical chemistry.

Table 6: Result of t-test analysis on the significant difference on the Administrative-related Challenges encountered by secondary school students in Practical Chemistry

Status	N	X	Sd	df	t-cal.	t-crit.	Remark
Male	57	2.81	0.76	64	0.13	1.96	NS
Female	39	2.79	0.76				

In Table 6, t-calculated is 0.13 and t-critical is 1.96. It shows that t-calculated is less than t-critical value. Then accept the null hypothesis of no significant difference. Hence, no significant difference between the mean ratings of male and female students on the administrative related challenges encountered by secondary school students in practical chemistry.

Discussion

The results of this study indicates that stealing materials for practical, and lateness to practical classes among others are the students' related challenges encountered by students during chemistry practical. This aligned with Koller, Olufsen and Stojanovska

(2015) who noted that students' poor attitudes to chemistry practical were discouraging in achieving instructional objectives.

The teachers' related challenges encountered by students during chemistry practical, are the use of unqualified teachers, teachers' lateness to practical classes and their rush to cover curriculum contents, relating to the finding is the opinion of Apuh (2020) who maintained that some of the teachers' personal characteristics such as truancy and lateness among others to a large extent undermine the students' achievement in chemistry.

Finally, the schools' inability to supply adequate equipment for practical, recruit unqualified

chemistry teachers and allot of less periods for practical among others are the administrative related challenges encountered by students during chemistry practical; which agreed with the finding of Nja, Cornelius-Ukpepi and Ihejiamazu (2019) who linked the poor achievement of students in chemistry to include among others the poor provision of laboratory facilities by the government and the school authorities.

Conclusion

Concerted efforts of the students, teachers and the school authorities are necessary in curbing the challenges encountered by students in practical chemistry lessons. There is urgent need for students to comply and be punctual to practical classes. The teachers should eschew lateness and avoid rush to cover curriculum contents. While the school authority should make adequate supply of equipment for practical, recruit qualified chemistry teachers and allot enough periods for practical chemistry in schools. This is necessary as it will enhance students overall interest and achievement in Chemistry because practical is the soul of scientific scholarship.

Recommendations

Government should provide the needed infrastructure and as well motivate teachers for effective conduct of practical in schools. Teachers should show adequate preparation before practical classes are conducted. Students should be made to know and appreciate the importance of practical classes to their entire performance in chemistry so that they will help to reduce the challenges they encounter during practical classes.

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