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Assessment Literacy of Chemistry Teachers in Selected Secondary Schools in Port Harcourt Metropolis, Rivers State, Nigeria

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Abstract

The study investigated the Assessment Literacy of Chemistry Teachers in Selected Secondary Schools in Port Harcourt Metropolis of Rivers State. Survey research design was employed and guided by two research questions and one hypothesis tested at 0.05 level of significance. The population consisted of 91 Chemistry teachers drawn from (29) public secondary schools. A sample of 56 Chemistry teachers was selected using purposive sampling technique. A self- structured questionnaire titled "Assessment Literacy of Chemistry Teachers Questionnaire" (ALCTQ) was used to collect data. The reliability of the ALCTQ was determined using Cronbach Alpha which produced a Coefficient of 0.74. Mean and Standard deviation was used to answer the research questions while t-test was used to test the hypothesis at 0.05 level of significance. The findings revealed high level of assessment literacy and gender has no significant influence on Chemistry teachers. Trainings, seminar and establishments of a standard guide on assessment of students learning development should be made available for chemistry teachers.

Keywords: Assessment, Assessment literacy, Chemistry Teacher, Gender.

INTRODUCTION

Teachers have a daily influence on the lives of students and are considered as the key features in the success of any educational system. Therefore, teachers are held to high standards in the education ecosystem. It is on this premise that the National Policy on Education (FRN, 2014) stated that no standard of education can rise above the quality of its teachers. Teaching as an intricate activity necessitates teachers, in the midst of all their responsibilities, to serve as models and demonstrate ethical behaviour as they interact with students, colleagues, parents and others. One of the most important components of teaching and learning is assessment.

Assessment is the process of organizing measurement data and fashioning them in an interpretable manner on the basis of which judgment (evaluation) could be made. One of the goals of assessment in education is to report and develop the continuous learning of students and the teaching of Curricula (Lynch, 2017). This can only be possible where teachers use quality assessment methods

in their classroom interactions (Freya, 2021). Quality assessment provides information about the effectiveness of information as well as helping both teachers and students make accurate determination about what an individual student has or has not learned and why.

In the teaching of Chemistry, teachers are expected to have a good level of competence and mastery of the subject matter before introducing it to the students; this will enhance effective teaching of the subject. The level of performance of students in senior secondary school chemistry has been a thing of concern in the educational sector. Many schools are equipped with modern education apparatus but if the teachers do not have the required knowledge to organize the classroom assessment for promoting the learning process, all the materials in the classroom will lose their value (Holmqvist, 2019). Competency in teaching refers to the ability of a teacher to exhibit, on the job, skills and knowledge gained as a result of training (Xiaoyao and Ruixuan, 2020). A competent teacher is regarded as an expert (Assessment Literacy).

Assessment Literacy is a state of being knowledgeable and competent in assessment matters, such as understanding which assessment methods to use, gather information to communicate assessment results effectively and to use assessment to maximize student motivation and learning by involving student as full partners in assessment, record keeping and communication. The concept was first introduced by Stiggins (1991) as cited by Looney (2018); he suggested that assessment literacy involves understanding how to produce good achievement date on both large scale and classroom tests, and the ability to interrogate and critique the test or assessment approaches used and the data produced. He referred to the 'built-in alarms' that alert those who are assessment literate, that sound when an assessment target is unclear, when an assessment method misses the target, when a sample of performance is inadequate, when extraneous factors are creeping into the data, and when the results are simply not meaningful to them. He also emphasized that knowing that there is a problem is not enough but those who are literate will demand or make changes when the alarm sounds. According to Popham (2011), assessment literacy is present when a person possesses the assessment related knowledge and skills needed for the competent performance of that person's responsibilities including ability to define clear learning goals which are the basis of developing or choosing ways to assess student's learning as well as knowing how to make use of a variety of assessment methods to provide accurate evidence of students learning.

A desirable characteristic that an assessment literate educator should possess irrespective of Gender (a state of being a male or female) include;

1. Super knowledge about content and substance of what is to be learnt
2. Knowledge about learners and learning, and a desire to help students develop, improve and do better.
3. Skills in selecting and creating assessment tasks
4. Knowledge of criteria and standards appropriate for assessment tasks.
5. Evaluation skills and expertise in the analysis and use of assessment information and
6. Expertise in giving appropriate targeted feedback.

There is no doubt that an enhanced level of assessment literacy will be a motivating factor for students' learning.

STATEMENT OF THE PROBLEM

One problem arising from the foregoing is the question of whether the present crop of chemistry teachers in our schools have the requisite level of assessment literacy, how to identify and handle the appropriate assessment techniques needed for different situations and utilise them competently and comprehensively to provide quality teaching and learning. Studies by Green and Mante (2002)

reported that most teachers do not use assessment strategies in their classrooms that are likely to improve instruction or students' learning. Their own work suggests that teachers feel comfortable using informal, formative types of assessment with their students such as observing students while working in groups and asking guiding questions thus thinking that such approaches allow them to provide students with feedback for improving their performance. In contrast, teachers indicated that they are not comfortable developing their own formal assessment to gauge students learning nor having the confident to use students result to improve their own practice.

PURPOSE OF THE STUDY

The purpose of the study is to survey the assessment literacy of chemistry teachers in selected secondary school in Port – Harcourt Metropolis in Rivers State, Nigeria.

Objectives of the study includes, to

1) Find out the Level of Assessment Literacy among Chemistry Teachers in selected Secondary Schools in Port- Harcourt Metropolis.
2) Investigate whether Gender Influence Teachers level of Assessment Literacy.

Research Questions

The following research questions were answered in the study

1. What is the level of assessment literacy among Chemistry teachers in selected Senior Secondary Schools in Port – Harcourt Metropolis?
2. To what extent does gender influence chemistry teachers' level of assessment literacy?

Hypothesis

Ho_1: Gender has no significant influence on Chemistry teachers' level of assessment literacy in senior secondary schools in Port – Harcourt Metropolis.

METHODOLOGY

The study adopted Survey Research design, this was considered appropriate because the study sought for the opinions of Chemistry teachers. The population of the study comprised of all chemistry teachers in senior secondary schools in Port Harcourt metropolis in Rivers State- Nigeria. The target population consists of chemistry teachers in government owned senior secondary schools in Port Harcourt Metropolis. Port Harcourt Metropolis is made up of two Local Government Areas, Port Harcourt City Local Government Area and Obio/Akpor Local Government Area. The population include Thirty-six (36) chemistry teachers from Port Harcourt City Local Government Area and fifty-five (55) chemistry teachers from Obio/Akpor Local Government Area of Rivers State. A sample of Fifty-Six (56) chemistry teachers were selected from the population of 91 chemistry teachers using purposive Sampling technique. Purposive sampling was chosen to purposely select only chemistry teachers.

Data was collected using a self-structured instrument titled Assessment Literacy of Chemistry Teachers Questionnaire (ALCTQ). The instrument consists of two sections. Section 'A' is the Respondents Demographic data while Section B contains items on the Assessment Literacy of Chemistry Teachers (measured the variables to be investigated). The items were scored using 4-point Likert Scale where, Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points and strongly Disagree = 1 point. The reliability of the ALCTQ was determined using Cronbach Alpha which produced a coefficient of 0.74. Mean and standard deviation was used to

answer the research questions while t-test was used to test the hypothesis at 0.05 level of significance.

DATA ANALYSIS AND RESULTS

Research Question One: What is the level of assessment literacy among Chemistry teachers in selected secondary schools in Port Harcourt metropolis?

To answer this question, descriptive statics of mean and standard deviation was employed to ascertain the level of assessment literacy among Chemistry teachers.

Table 1: Level of Assessment Literacy Among Chemistry Teachers in Selected Secondary Schools in Port Harcourt Metropolis

S/N	ITEMS	Mean	Std.	Remark
1.	I can interpret information about student's performance.	3.66	.549	High
2.	I have a good mastery of assessment tools.	3.57	.684	High
3.	Feedbacks on students performances help them to learn better.	3.52	. 738	High
4.	I have good knowledge of the procedures of test construction.	3.46	.738	High
5.	I assess my students' knowledge of chemistry by use of class test only.	3.04	1.044	High
6.	There is no need to plan well before conducting any form of formative assessment.	3.55	.807	High
7.	Periodic class assessment is a waste of time.	3.29	1.140	High
8.	In chemistry, students understanding of practical is assessed by observation.	**2.79**	**1.107**	**Moderate**
9.	I use achievement test to measure the amount of knowledge my students acquired in chemistry.	3.04	.762	High
10.	I use observational technique to assess my students behaviour during chemistry practical	3.04	.953	High
11.	The way a student relates with others during chemistry lesson in a measure of his/her interpersonal skills.	3.14	.841	High
12.	At times I use student's notebook to assess them.	3.13	.605	High
13.	I give periodic homework to my students.	3.07	.951	High
	Criterion Mean (X) = 2.5	**Grand mean=3.26**		**High**
	N=56			

Remark: High = 3.0 – 4.0, Moderate = 2.5 – 2.99, Poor = 1.0-2.49

Table 1 shows the level of assessment literacy among Chemistry teachers in selected secondary schools in Port Harcourt metropolis. It is important to note that the study employed the 4-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1); which was later categorized into three levels. The mean level of assessment literacy was categorized into three – *High, Moderate* and *Poor.* A mean score below the criterion mean of 2.5 is classified as low while, a mean score between 2.5 to 2.99 showed moderate level. Similarly, high level begins from a mean of 3.0 to 4.0- meaning that most participants performed well on the item.

Therefore, based on the grand mean of 3.26 which is far above the criterion mean of 2.5, the result reveals that respondents showed high level of assessment literacy on the average. This implies that majority of the respondents possess good knowledge of assessment in teaching Chemistry. As such, it was observed that 13 out of 14 items recorded high level of assessment literacy except one item which had moderate level of literacy. However, the result reveals that item eight (8) had a moderate level of acceptance by respondents. The item which is on assessment of Chemistry practical through observation did not get the support of nearly half of the respondents.

Research Question Two: To what extent does gender influence chemistry teachers' level of assessment literacy? To analyze this research question, mean and standard deviation was employed to ascertain the extent that gender influence chemistry teachers' level of assessment literacy.

Hypothesis One: Gender has no significant influence on chemistry teachers' level of assessment literacy in selected senior secondary schools in Port Harcourt metropolis. The null hypothesis is tested using independent t-test statistics at an alpha level of significance.

Table 2: t-test Analysis for Influence of Gender on chemistry teachers' level of assessment literacy

Gender	N	Mean	Std.	Df	Alpha	T	Sig.(P)	Decision
Female	27	3.22	.572	54	0.05	.577	.566	**Not significant,** P> 0.05.
Male	29	3.14	.515					

Results from the above table showed that gender has a slight influence on chemistry teachers' level of assessment literacy, with the female teachers performing (X=3.22> 2.5) slightly higher than their male counterparts (X=3.14> 2.5). However, both male and female teachers maintain high level of assessment literacy with their mean scores higher than the criterion mean of 2.5.

Results from the table above show that the calculated t-score at df (54) is 0.577 with a P value (0.566) greater than the chosen alpha (P> 0.05); thus, the null hypothesis is not rejected. This implies that gender has no significant influence on chemistry teachers' level of assessment literacy in selected senior secondary schools in Port Harcourt metropolis.

DISCUSSION OF FINDINGS

From the research Question One**,** it was found that majority of the respondents scored high on the assessment literacy level. This implies that majority of the respondents possess good knowledge of assessment in teaching Chemistry. The fact that majority of the respondents have educational qualification may have affected the result as they must have acquired such knowledge from their training in school. This is the opposite of the findings of Oluwatayo and Bandele (2013) who reported very low knowledge of assessment techniques among their study participants and Yasar (2020) who found chemistry teachers seriously deficient in the formative assessment techniques.

Generally, in secondary schools, chemistry questions are usually extensive in covering the lesson contents especially theoretical knowledge but in terms of the assessment, that is, using various assessment to cover different learning orders the teachers either do not have patience or skill or they simply are not literate enough to do so. Tacoshi and Fernandez (2015) found a general lack of intrinsic knowledge among chemistry teachers to assess students elaborately in terms of higher order thinking and to use their assessment as tool to improve teaching and learning, plan properly as well as to carry out assessments for learning process regulations and promotions.

The result of the study is similar to the findings of Ogbeide (2015) that secondary school teachers' competencies in test construction was high. However, the result also showed that despite the high level of assessment literacy among the respondents there seem to be a problem on the assessment of chemistry practical through observation as the item on this did not get the support of nearly half of the respondents. This is not surprising to the researcher at all given the poor state of science laboratories in public secondary schools. Some of public schools in the area of study do not have available functional Chemistry laboratories. This situation makes the applicability of observation method of assessment unattainable. What can be observed in a non-functional laboratory? The implication of this on student learning is that their learning assessment is not holistic and as such their progress cannot be truly monitored since chemistry as a science subject has practical knowledge as an important aspect of coverage. Practical knowledge is key to developing students progress in the subject of chemistry as it helps to remove abstraction from the subject and to make it more interesting. Therefore, any efforts made at exposing the student to such should be encouraged.

From the result of Research Question Two and Hypothesis One as presented in table 2 the slight influence of gender (female higher than male, n= 3.22 and 3.14 respectively) on the respondents' level of assessment literacy was not significant. It follows that gender has no significant influence on chemistry teachers' assessment literacy level. This finding well aligns with the finding of Ogbeide (2015). However, Oluwatayo and Bandele (2013) study found female teachers to be more assessment-literate than males.

In the view of the researcher, the slight influence of female gender on level of assessment literacy may be owing to the fact that female teachers by nature tends to be more patient and detailed than their male counterpart. Female teachers can get emotional and seek to explore every means possible to assess students to see if the students can pass by employing other assessment skills.

CONCLUSION AND RECOMMENDATIONS

Based on the findings, it was concluded that the chemistry teachers in senior secondary schools in Port Harcourt Metropolis have high level of assessment literacy and that Gender does not influence chemistry teachers' level of assessment. However, it was also found that about half of them disagree in the use of observation to assess practical knowledge. This is a strong suggestion that the teachers lack adequate assessment skill to assess other higher other learning developments. It was inferred that the teachers may well possess good theoretical assessment literacy but in practice may not have the enabling environment to really put to use their assessment literacy skills so as to truly test the extent utilization of such skills given the nature of our educational system which places so much emphasis on summative assessment and theoretical knowledge plus the high student teacher ratio in the public schools. Lastly, the study found out that teachers would need lots of capacity building programmes such as in service and on the job trainings that will enhance their assessment literacy and skill and possibly be provided with an assessment guide.

The following recommendations were made following the study findings:

1. School authorities and curriculum developers should emphasize other assessment techniques that will assess higher order learning rather than concentrating on summative assessments that focuses on cognitive domain and mainly used for the purpose of termly or yearly promotions.
2. Trainings, seminars, establishments of a standard guide on assessment of students learning development should be made available for chemistry teachers and other science teachers as well. This can be a regular feature of Science Teachers Association of Nigeria (STAN), and the Schools Board in collaboration with the Ministry of Education.

3. Teachers should be encouraged by their employers to pursue further study advancement to enhance and update their knowledge not just in their area of discipline but also in pedagogical knowledge as this has proven to have influence teachers' assessment literacy and skills. This can be done by way of scholarship grants and rewards- promotions or some form of recognition on the completion of such programmes. This will serve as motivation for teachers to seek to develop themselves and as well help improve teaching and learning quality.

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