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ASSESSMENT LITERACY AMONG SCIENCE TEACHERS IN PUBLIC SECONDARY SCHOOLS IN UYO EDUCATIONAL ZONE, AKWA IBOM STATE, NIGERIA

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Abstract
Teachers' assessment literacy is paramount for effective teaching and learning in the school. The knowledge of this should motivate every teacher to acquire an understanding of assessment literacy to be well-equipped for using data and making sound decisions about the learners. The general purpose of this study was to examine the level of assessment literacy among science teachers in the Uyo Educational Zone of Akwa Ibom State, Nigeria. The instrument used for the study was an adapted form of the 'Classroom Assessment Literacy Inventory (CALI)'. Out of a population of 127 science teachers, 68 were randomly selected to complete the adapted inventory. Test-retest was used to establish the instrument's reliability, which gave an index of 0.91. The study's findings revealed that Science teachers in the study area have a moderate level of assessment literacy. The findings also revealed that gender has no significant influence, while years of working experience has a significant influence on the teachers' assessment literacy. In conclusion, the moderate level of assessment literacy among science teachers underscores the need for targeted professional development programs for teachers at all career stages and also highlights the value of mentorship to align with contemporary educational demands.
Keywords: Assessment literacy, Public secondary schools, Science teachers.

Introduction

Assessment is crucial in the school system as its benefits are felt by all the stakeholders of education. For assessment to be practical, it must be carried out by one who understands the intricacies involved in the assessment process. Teacher quality assessment is not feasible if they do not possess a prerequisite knowledge of how it is being carried out: assessment literacy. Assessment literacy can be described as the sound knowledge and skills in the educational assessment required by teachers in assessing students'/learners' learning outcomes.

Yu et al. (2016) conceptualised assessment literacy as teachers' understanding of foundational assessment concepts (assessment purposes, assessment processes, communication of assessment results, assessment fairness, assessment ethics, measurement theory, assessment for learning education support for teachers) and how these concepts are implemented during educational decisions. Mertler in Mellati & Khademi (2018) explains assessment literacy as the readiness of a teacher to design, implement, and discuss assessment strategies, measurement tools, evaluation criteria, decision-making milestones, and formative and summative tests.

Genuine assessment procedures in the classroom play essential roles in ensuring learners meet instructional goals. With this, teachers are to have a command of various forms of classroom assessment. They need to be able to create and implement valid and reliable assessments to measure learners' learning and determine the effectiveness of their teaching. They also need to be able to discuss the results of their classroom assessments with learners and their presents and also use the results of their assessments to incorporate more appropriate educational instruction (Bastian et al., 2016; Biziat & Coleman, 2015; Uko et al., 2018).

Proper assessment literacy development is rooted in teacher training and professional development (Eluwa & Uko, 2018). During their training and professional development, teachers are usually updated on three key components of assessment literacy: principles, skills and knowledge of assessment. The principles, skills and knowledge entail identifying and using effective assessment methods, utilising assessment to maximise learning, interpreting and applying assessment results and incorporating assessment in decision-making as well as the purpose of assessment (Abell & Siegel in Akayuure; 2021). However, even with this update, most teachers do not imbibe or apply these principles, skills, and knowledge effectively in their assessment practices.

To measure teachers' assessment literacy, the American Federation of Teachers (AFT), the National Council on Measurement in Education (NCME) and the National Education Association (NEA) developed assessment standards for measuring teachers' assessment literacy. The standards are as follows:

Standard: **Indicator**

Standard 1: Teachers should be skilled in choosing appropriate assessment methods for instructional decision-making.
Standard 2: Teachers should be skilled in developing appropriate assessment tasks, methods and tools for making instruction decisions.
Standard 3: Teachers should be skilled in administering, scoring and interpreting assessment outcomes.
Standard 4: Teachers should be skilled in using assessment outcomes to make decisions about students, plan for instruction, develop curriculum, and improve the school system.
Standard 5: Teachers should be skilled in developing valid grading procedures for assessing students' achievement.
Standard 6: Teachers should be skilled in communicating assessment outcomes with students, parents, educators, etc.
Standard 7: Teachers should be skilled in recognising unethical, illegal and inappropriate assessment methods and uses of assessment information.

These standards, as observed by Yamtim and Wongwanish (2014), relate assessment to instruction, such that effective instruction cannot take place without quality assessment of learners' learning. These standards are also considered in the present study to measure the science teachers' assessment literacy levels.

Researchers have tried to investigate pre-service teachers' level of assessment literacy before their teaching practicum using super-item tests and concluded that most of the samples were stuck at low levels and did not perform well in selecting and constructing assessment tasks. Sbai (2018) explored K-12 teachers' perceptions of their assessment literacy and obstacles that hinder them from conducting effective assessments for their students. The study concluded that teachers have a high perception of their assessment literacy but lack training on assessment literacy. Lian et al. (2014) posit that assessment literacy should focus more on practical issues of validity, reliability, transparency, fairness, and information usage.

Previous studies have indicated that teachers are sometimes unprepared to develop, administer and interpret assessments (Larsari, 2021; Zee & Koomen, 2016). They are less skilled and experience difficulty in developing authentic assessments. However, in Akwa Ibom State, Nigeria, research in assessment literacy is rare. This study, therefore, contributes to the limited literature by investigating the level of assessment literacy among science teachers in public secondary schools in Uyo Educational Zone of Akwa Ibom State, Nigeria. The general purpose of the study was to investigate the level of assessment literacy among science teachers in Uyo Educational Zone of Akwa Ibom State. Specifically, the study sought to:

1. Examine the level of assessment literacy among science teachers in the study area.
2. Investigate if gender influences science teachers' assessment literacy level in the study area.
3. Investigate if years of working experience influences science teachers' assessment literacy level in the study area,

Research Question: What is the level of assessment literacy among science teachers in Uyo Educational Zone of Akwa Ibom State, Nigeria?

Research Hypotheses

1. Gender does not significantly influence science teachers' assessment literacy level in Uyo Educational Zone of Akwa Ibom State, Nigeria.
2. Years of working experience do not significantly influence science teachers' assessment of literacy level in the Uyo Educational Zone of Akwa Ibom State, Nigeria.

Methodology

The study adopted a survey research design since it was investigating the situation as it existed at the time of the research. According to Check & Schutt in Ponto (2015), survey research collects information from individuals' responses to questions. The population for the study was 127 Science teachers (Biology, Chemistry and Physics teachers) from the fourteen (14) public secondary schools in the study area. The researchers considered the fourteen schools as fourteen clusters. Out of these, seven (7) clusters were randomly selected for the study through a simple random sampling technique by balloting and replacement method. From the seven sampled schools (clusters), all the science teachers present during the researchers' visit participated in the study. A total of sixty-eight (68) teachers made up the study sample.

An adapted form of the "Classroom Assessment Literacy Inventory (CALI) " was used to collect data for the study. The original form of the instrument has five questions per each of the seven standards, making a total of thirty-five items (35). However, the modified form used in this study had three questions per each standard, resulting in twenty-one (21) items. The reduction was envisaged because respondents often avoid instruments with many items. Test-retest was used to establish the reliability coefficient of the instrument; this gave an index of 0.91. Data collected were analysed using descriptive statistics and independent t-test statistics. In addition, Ashur's criteria for ascertaining the levels of knowledge in Thompson et al. (2023) were used as the decision guide for ascertaining levels of knowledge inherent in the Science teachers regarding assessment literacy. The overall grand percentage was used to answer the research question, while the t-values were used to accept or reject the null hypotheses.

Table 1: Decision guide for ascertaining levels of knowledge

S/N	Percentage	Remarks

1.	0 – 39	Low level of knowledge (LLK)
2.	40 – 59	Moderate level of knowledge (MLK)
3.	60 – 79	High level of knowledge (HLK)
4.	80 – 100	Very high level of knowledge (VHLK)

Results

Research question: What is the level of assessment literacy among Science teachers in Uyo Educational zone of Akwa Ibom State, Nigeria? (N=68).

Table 2: Science teachers' level of assessment literacy in Uyo Educational Zone of Akwa Ibom State, Nigeria

Variable	Frequency (f)	Percentage (%)	Score	Decision
S1 Q_1	34	50.00		
- Q_2	33	48.53		
- Q_3	36	52.94		
		50. 49		MLK
S2 Q_1	22	32.35		
-Q_2	24	35.29		
-Q_3	21	30.88		
		32.84		LLK
S3 Q_1	36	52.94		
-Q_2	37	54.41		
-Q_3	38	55.88		
		54.41		MLK
S4 Q_1	23	33.82		
-Q_2	25	36.76		
-Q_3	27	39.71		
		36.76		LLK
S5 Q_1	24	35.29		
-Q_2	27	39.71		
-Q_3	25	36.76		
		37.25		LLK
S6 Q_1	33	58.53		
-Q_2	36	52.94		
-Q_3	38	55.88		
		52.95		MLK
S7 Q_1	34	50.0		
-Q_2	32	47.1		
-Q_3	35	51.5		

	49.53	MLK
Grand Percentage	**44.82**	**MLK**

The result shown in Table 2 above reveals that science teachers in the Uyo educational zone of Akwa Ibom State, Nigeria, have a moderate level of assessment literacy. From the table, one could see that in most of the sections of the scale, about half of the teachers scored the items right. For instance, in S3, 36 out of the 68 teachers got Q1 correct, 37 got Q2 correct, and 38 got Q3 correct.

Hypothesis 1: Gender does not significantly influence science teachers' assessment literacy level in Uyo Educational zone of Akwa Ibom State, Nigeria.

Table 3: Summary of t-test analyses of the difference in assessment literacy levels between male and female science teachers in Uyo Educational zone of Akwa Ibom State, Nigeria.

Variables	**N**	**X**	**SD**	**t-cal**	**t-crit**	**df**	**p-value**
Male	27	9.71	0.41				
				1.26	1.67	66	.13
Female	41	9.42	0.39				

t-calculated< t critical at 0.05 level of significance

Table 3 shows that gender does not significantly influence science teachers' assessment literacy level in Uyo Educational zone of Akwa Ibom State, $t(66) = 1.67$, $p > .05$.

Hypothesis 2: Years of working experience does not significantly influence science teachers' assessment literacy levels in Uyo Educational zone of Akwa Ibom State, Nigeria.

Table 4: Summary of t-test analysis of the difference in assessment literacy levels between science teachers that have taught for twenty-five years and above and those that have taught for less than twenty-five years.

Variables	**N**	**X**	**SD**	**t-cal**	**t-crit**	**df**	**p-value**
25 years and above	29	8.32	0.43				
				1.84	1.67	66	.002
Less than 25 years	39	10.31	0.31				

t-calculated > t-critical at 0.05 level of significance

Table 4 shows that years of working experience significantly influenced science teachers' assessment literacy levels in the Uyo Educational zone of Akwa Ibom State, Nigeria, $t(66) = 1.67$, $p < .05$.

Discussion of Findings

The findings of this study indicate that science teachers in the Uyo Educational Zone of Akwa Ibom State exhibit a moderate level of assessment literacy, as evidenced by their performance on the assessment literacy scale. However, some of the scale segments, S2, S4 and S5, had low levels. This means that the teachers are not skilled in: (1) Developing appropriate assessment tasks, methods and skills for making decisions about instruction. (2) Using assessment outcomes to make decisions about students to plan for instruction. (3) Developing valid grading procedures for assessing students' achievement. This aligns with existing literature that considers teachers to possess basic to moderate proficiency in educational assessment practices but lacks deeper knowledge and skills essential for advanced assessment tasks (DeLuca et al., 2019; Izci & Caliskan, 2017). However, moderate literacy levels could hinder effective teaching and learning outcomes, as assessment literacy is critical for designing valid, reliable, and fair evaluations (Brookhart, 2011). Studies conducted in other regions have noted similar trends where teachers understand fundamental assessment concepts but struggle with advanced competencies like analysing assessment data or aligning assessments with curriculum goals (Eluwa & Uko, 2018; Popham, 2009).

Looking at the general level of assessment literacy, the findings revealed a moderate level of assessment literacy among science teachers in the Uyo Educational Zone. This aligns with global trends, as many teachers are often underprepared to meet the increasing demands of modern assessment practices, which are incredibly formative and diagnostic assessments. Xu and Brown (2016) emphasise that assessment literacy involves more than technical skills; it is deeply contextual and tied to teachers' professional experiences and educational policies. Similarly, Herppich et al. (2018) found that teachers' assessment practices are shaped by their specific teaching contexts, highlighting the challenges of developing a universally high level of assessment literacy. This result is dissimilar to the result Lian & Yew (2020) obtained when they investigated pre-service teachers' levels of assessment literacy. Their samples were stuck at low levels. These results, moderate and low levels, suggest the need for targeted professional development to improve science teachers' assessment literacy.

Considering the influence of gender on assessment literacy, the study found that gender does not significantly influence assessment literacy levels among science teachers in Uyo Educational Zone. The performance of the male and female science teachers were almost the same as indicated in their mean scores. This finding corroborates studies by Ali

et al., (2021) and Alkharusi et al. (2012), which found no significant gender differences in assessment literacy among teachers. Both male and female teachers displayed comparable levels of competence, suggesting that factors such as access to training, professional development opportunities, and workplace support play a more crucial role than gender.

Conversely, some researchers, such as Onen and Ugwuanyi (2020), argue that societal and cultural factors might cause subtle variations in gender-related performance in teachers' competencies. While this does not appear to be the case in the present study, further exploration might be necessary to confirm the broader generalizability of this finding. The study also supports findings by Uko et al. (2018), Willis et al. (2013) and Brookhart (2024), which suggest that gender is not a primary determinant of assessment literacy. Instead, factors such as professional development opportunities and institutional support impact teachers' assessment competencies more.

The influence of years of working experience on assessment literacy revealed that years of working experience significantly influence assessment literacy levels, with teachers having fewer than 25 years of experience performing better than their more experienced counterparts. This finding may seem counterintuitive but aligns with studies suggesting that younger teachers or those with less experience are often more receptive to new pedagogical practices, including modern assessment techniques (Volante & Fazio, 2007). Experienced teachers may rely more on traditional assessment practices, which could explain the disparity. Additionally, this aligns with findings by Giraldo (2021), which highlight the importance of continuous professional development to update and enhance assessment literacy across all career stages. This finding is at variance with that of Gan and Lam (2024), who argue that self-directed learning through years of teaching enhances assessment literacy. According to them, experienced teachers are more likely to integrate assessment knowledge with classroom practices effectively, which was not the case with the finding of this study.

However, this research has exposed the present level of assessment literacy of Science teachers in the study area. With this awareness, the researchers believe that Science teachers will do more to improve their knowledge of all that is involved in assessing their students. With an improved level of assessment literacy among the science teachers, the science students will understand and love science subjects, which are important for national development as they constitute or establish the basis for technological advancement of any country.

Conclusion and Recommendations

The present study investigated assessment literacy among science teachers in public secondary schools in the Uyo Educational Zone of Akwa Ibom State, Nigeria. Assessment literacy is an essential commodity every teacher should have at a high level. Unfortunately,

the sample in the present study has only a moderate level of assessment literacy. The moderate level of assessment literacy among science teachers in the Uyo Educational Zone underscores the need for targeted professional development programs. While gender did not influence literacy levels, highlighting equity in access to assessment training and resources for male and female teachers, years of teaching experience proved significant. Teachers with fewer years of working experience demonstrated better assessment literacy than their more experienced counterparts, underscoring the need for continuous professional development for teachers at all career stages. More so, the value of mentorship and experience-sharing among teachers can never be over-emphasised. Efforts should also be focused on equipping all teachers with advanced training in formative and summative assessment techniques to align with contemporary educational demands.

1. Education stakeholders should continuously organise training workshops and seminars for teachers focused on different aspects of assessment and advanced assessment practices to keep them abreast of the developing trends in assessment.
2. Education policymakers should integrate regular assessment literacy programs into teacher training curricula.
3. Teachers should change their old beliefs and update their assessment practices regularly.
4. The factors influencing assessment literacy in different educational zones of Akwa Ibom State and beyond should be investigated.

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