



Perception of Secondary School Stem Teachers' Classroom Assessment Practices in Ilorin and Ibadan, Nigeria

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Abstract

This study examined secondary school STEM teachers' perception of classroom assessment practices in Ilorin and Ibadan, Nigeria. Three research questions and two null hypotheses guided the study. A cross-sectional descriptive survey was conducted with 137 Biology, Chemistry, Mathematics and Physics teachers. Data were collected using the researcher-developed 4-point Likert scale questionnaire titled "Perspective of Secondary School STEM Teachers on Classroom Assessment Practices (PSTCAP)", validated by three experts. The 71 perception items yielded a reliability coefficient of .882. Mean, standard deviation, independent-samples t-test and one-way ANOVA were used for analysis at the 0.05 significance level. Teachers showed a positive perception across all five assessment areas, although measurement theory was the weakest. No significant differences were found based on gender or subject specialisation. The study concludes that assessment needs appear to cut across teacher groups. Professional development should therefore prioritise measurement theory and practical interpretation of assessment evidence.

Keywords: Assessment Literacy, Classroom Assessment, Nigeria, Secondary Education, STEM Teachers

Introduction

Classroom assessment is more than the process of assigning scores to students. It forms part of the decisions teachers make about what students have learnt, where difficulties remain and what should happen next in instruction. This is particularly important in secondary school Science, Technology, Engineering and Mathematics (STEM) education, where learning may involve practical work, scientific reasoning, problem solving and interpretation of evidence rather than factual recall alone. In Nigeria, continuous assessment also forms part of the formal evaluation of learners, which gives teachers' classroom assessment decisions direct relevance to both teaching and students' academic progress (Federal Republic of Nigeria, 2013).

Effective classroom assessment depends partly on how teachers perceive the processes involved in assessment. This study conceptualised perception of classroom assessment practices as teachers' self-reported beliefs about and agreement with sound practices relating to assessment types, purposes, measurement theory, utilisation of assessment results and assessment-related issues.

These perceptions should not be treated as direct evidence of demonstrated assessment competence. Assessment literacy extends beyond familiarity with tests and includes the knowledge and judgement required to select appropriate assessment methods, interpret evidence and use assessment information to support teaching and learning (Popham, 2009; Pastore, 2023). In STEM classrooms, this becomes especially relevant because different learning outcomes may require different forms of evidence and scoring judgement. Hung and Wu (2024), for example, showed that assessment in inquiry-oriented science teaching involves decisions about assessment purposes, learning outcomes, strategies and scoring.

Nigerian studies suggest that teachers do not engage equally with every aspect of classroom assessment. Ugwu and Ezeokoli (2022) reported weaknesses in assessment literacy and classroom assessment practice among teachers in Ibadan. Among science teachers, Nwafor et al. (2024) found that summative, formative and diagnostic assessments were not used to the same extent, while

Babatimehin et al. (2025) reported weaknesses in teachers' knowledge and implementation of school-based assessment. These findings point to an uneven pattern rather than a simple conclusion that teachers either possess or lack assessment knowledge. They also suggest that examining classroom assessment as one broad construct may conceal the areas in which teachers feel more or less confident.

Teacher characteristics may also be associated with these perceptions, and a characteristic considered in this study is gender. In this context, gender refers to the teacher's self-reported sex (either male or female) and is treated as a demographic attribute for comparing perception scores. Evidence on gender and teacher assessment literacy is inconsistent across contexts and assessment constructs. Mirian and Zulnaidi (2020) and Muhson et al. (2025) reported gender-related differences in particular assessment constructs, whereas Abdulmumini (2025) found no significant gender difference in selected classroom-assessment skills. In Nigeria, Babatimehin et al. (2025) reported low school-based assessment knowledge among both male and female teachers and placed greater emphasis on implementation and preparation than on gender. Khan et al. (2022) likewise reported gender differences in teachers' perceived assessment practices in another context. Taken together, these findings do not support a uniform gender pattern; gender was therefore treated in the present study as an empirical comparison variable rather than an explanatory determinant.

Furthermore, the subject a teacher teaches may be another teacher characteristic. Subject specialisation, as used in this study, refers to the subject a teacher teaches which is either Biology, Chemistry, Mathematics or Physics. Although these subjects share a STEM orientation, they do not require students to demonstrate learning in identical ways. A chemistry practical, a mathematics problem, a physics calculation and a biology investigation may call for different forms of evidence and judgement. Ergül and Çetin (2021) reported differences in teachers' measurement and assessment literacy according to subject branch, while Hung and Wu (2024) showed that assessment decisions in science can depend on the nature of the learning being assessed. It is therefore reasonable to examine whether teachers from different STEM specialisations perceive classroom assessment differently.

Previous Nigerian studies have examined particular forms of assessment among science teachers, general school-based assessment among secondary-school teachers, assessment literacy among teachers outside STEM, and classroom assessment practice as separate issues (Ugwu & Ezeokoli, 2022; Nwafor et al., 2024; Babatimehin et al., 2025). However, these studies do not show how Biology, Chemistry, Mathematics and Physics teachers respond across several classroom assessment areas within the same study, or whether those perceptions vary by gender and subject specialisation in Ilorin and Ibadan. The present study addresses this gap by examining five areas of classroom assessment together. Its contribution lies in showing where STEM teachers' perceptions are comparatively stronger or weaker and whether the pattern observed is associated with demographic or disciplinary grouping. This provides a more focused basis for identifying the areas of classroom assessment that may require greater attention in teacher preparation and professional development.

Theoretical Framework

This study used the Teacher Assessment Literacy framework, Richard J. Stiggins (1991). Stiggins described an assessment-literate teacher as one who can distinguish sound from unsound assessment and use assessment information appropriately. The framework emphasises informed judgement about assessment purpose, method, interpretation and use.

The framework is relevant because the study examines teachers' perceptions across five areas: assessment types, purpose of assessment, measurement theory, assessment-related issues, and utilisation of assessment results. These areas reflect important decisions teachers make when selecting assessment methods, judging the quality of assessment and using results to guide instruction.. Therefore, Stiggins' framework Stiggins' framework therefore helps interpret differences across the five areas, while gender and subject specialisation in this study are treated only as comparison variables.

Research Questions

1. What are secondary school STEM teachers' perceptions of classroom assessment practices?

2. What are secondary school STEM teachers' perception of classroom assessment based on gender?
3. What are STEM teachers' perceptions of classroom assessment based on area of specialisation?

Research Hypotheses

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

- H₀₁: There is no statistically significant difference in secondary school STEM teachers' perception of classroom assessment based on gender.
- H₀₂: There is no statistically significant difference in secondary school STEM teachers' perception of classroom assessment scores based on area of specialisation.

Method

The study employed a cross-sectional descriptive survey design. Nworgu (2015) describes this design as one in which a group is studied by collecting and analysing data from a few people or items considered representative of the entire group, without manipulating any variable. The design was suitable because the study sought STEM teachers' perception of classroom assessment as it exists, from a sample of teachers in Ilorin and Ibadan.

The study was conducted in Ilorin, Kwara State and Ibadan, Oyo State. The target population comprised secondary school teachers of Biology, Chemistry, Physics or Mathematics in both private and public schools in the two study areas. A precise numerical estimate of this population was not available from a single reliable source because available education statistics were not sufficiently disaggregated by study location, school ownership and subject taught. The eligibility criteria included current secondary school teaching in one of the four subjects, employment in either study location and consent to participate. The sample consisted of 137 teachers from 15 schools in Ilorin and Ibadan. Convenience sampling was used, as teachers who

met the eligibility criteria and were accessible during the data collection period were invited to participate.

The instrument for data collection was researcher-developed questionnaire titled "Perspective of Secondary School STEM Teachers on Classroom Assessment Practices (PSTCAP)." It had three sections. Section A contained demographic information of respondents (gender and subject specialisation, and years of teaching experience). Section B contained 71 items on perception of classroom assessment in five clusters (assessment types; 25 items, purposes of assessment; 5 items, measurement theory; 15 items, utilisation of assessment results; 12 items, and assessment-related issues; 14 items), rated on a four-point scale of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1). Section C contained 12 items on application of assessment practices, rated Very Frequently (4), Frequently (3), Rarely (2) and Not at All (1). This study utilised the 71 perception items in section B because the study focused specifically on teachers' perception of classroom assessment practices.

The PSTCAP was face and content-validated by three experts (two in Measurement and Evaluation and one in Science Education, university of Ilorin). The instrument was trial-tested on 14 STEM teachers in Oyo town who were not part of the study. Internal consistency was estimated using Cronbach's alpha, with a reliability value of .882 for the 71 items in Section B.

Paper copies were administered directly to respondents and collected after completion, while the electronic version was distributed through Google Forms. The data were analysed in IBM SPSS Statistics version 27. Research questions 1 to 3 were answered using mean and standard deviation. A criterion mean of 2.50 was used; a mean of 2.50 and above indicated a positive perception (or frequent application), and a mean below 2.50 indicated a negative perception (or infrequent application). Hypothesis one was tested with an independent-samples t-test and hypothesis two was tested using a one-way ANOVA. Statistical significance was set at 0.05, with Cohen's d and η^2 reported as effect sizes.



Results

Results are presented below:

Research Question One: What are secondary school STEM teachers' perceptions of classroom assessment practices?

Table 1: Showing the mean and standard deviation of each measured areas for perceptions of classroom assessment practices across five measured clusters.

Assessment area	Items	M	SD	Decision
Assessment types	25	3.14	0.45	Positive
Utilisation of assessment results	12	3.07	0.44	Positive
Measurement theory	15	2.80	0.32	Positive
Assessment-related issues	14	2.90	0.35	Positive
Purpose of assessment	5	2.91	0.47	Positive
Total	71	2.99	0.29	Positive

Table 1 shows that all five assessment areas recorded mean values above the criterion mean of 2.50, indicating a positive perception of each assessed areas. Assessment types recorded the highest mean value of 3.14 (SD = 0.45), while measurement theory had the lowest mean value of 2.80 (SD = 0.32).

The study recorded an overall mean value of 2.99 and SD of 0.29 across the 71 perception items,

suggesting that the teachers generally had a positive perception of classroom assessment practices. In the context of this study, the overall mean of 2.99 indicates that a positive classroom assessment practices among the secondary school STEM teachers. The relatively low standard deviation of 0.29 also suggests that the teachers' responses were fairly similar, with limited variation in their perceptions across the measured areas

Research Question Two: What are secondary school STEM teachers' perception of classroom assessment based on gender?

Table 2: Showing the mean and standard deviation of secondary school STEM teachers' perception of classroom assessment based on gender

Gender	n	Mean	SD	Decision
Female	74	2.98	0.27	Positive
Male	63	3.02	0.31	Positive

Table 2 shows that both male and female secondary school STEM teachers had mean scores above the criterion mean of 2.50. Male teachers recorded a slightly higher mean score of 3.02 (SD = 0.31), while female teachers had a mean score of 2.98 (SD = 0.27). This indicates that both male and

female teachers had a positive perception of classroom assessment practices. However, the difference in their mean scores was small, suggesting that their perceptions were generally similar.

Hypothesis one: There is no statistically significant difference in secondary school STEM teachers' perception of classroom assessment based on gender.

Table 3: Showing the Independent Sample t-test of significant between secondary school STEM teachers' perception of classroom assessment and gender

Gender	n	M	SD	Mean diff.	t(df)	p	d	Decision
Female	74	2.98	0.27	-0.041	-0.82 (135)	.414	0.14	Not Rejected
Male	63	3.02	0.31					

The hypothesis test shows a p-value of 0.414, which is greater than the criterion value 0.05. Thus, the gender difference was not significant, and H_{01} was not rejected. The small effect size (Cohen's

$d = 0.14$) indicates that the difference in perception between male and female STEM teachers was minimal.

Research Question 3: What are STEM teachers' perceptions of classroom assessment based on area of specialisation?

Table 4: Showing the mean and standard deviation of secondary school STEM teachers' perception of classroom assessment based on subject specialisation

Area of specialisation	n	Mean	SD	Decision
Biology	41	3.01	0.30	Positive
Chemistry	61	3.00	0.32	Positive
Mathematics	18	2.99	0.20	Positive
Physics	17	2.93	0.22	Positive

The table above shows that Biology, Chemistry, Mathematics and Physics teachers all recorded mean scores above the criterion mean of 2.50, indicating a positive perception of classroom

assessment practices across the four subject areas. Biology teachers had the highest mean score of 3.01 (SD = 0.30), while Physics teachers recorded the lowest mean score of 2.93 (SD = 0.22).

Hypothesis Two: There is no statistically significant difference in secondary school STEM teachers' perception of classroom assessment scores based on area of specialisation

Table 5: Showing the One-way ANOVA of secondary school STEM teachers' perception of classroom assessment and area of specialisation

Source	SS	df	MS	F	p	η^2	Decision
Between groups	0.077	3	0.026	0.300	.825	.007	Not rejected
Within groups	11.372	133	0.086				
Total	11.449	136					

The result in table 5 shows that there was no statistically significant difference in STEM teachers' perception of classroom assessment practices based on area of specialisation, $F(3, 133) = 0.300$, $p = 0.825$. Since the p-value was greater than 0.05, the null hypothesis was not rejected, indicating that the differences across area of specialisation were not statistically significant. The effect size was also very small ($\eta^2 = 0.007$), meaning that subject specialisation accounted for less than 1% of the variation in teachers' perception scores.

Discussion

The study found that secondary school STEM teachers generally had a positive perception of classroom assessment practices, although their responses varied across the five assessment areas. Perception was strongest for assessment types and weakest for measurement theory. This may be because teachers encounter routine assessment forms more frequently than technical concepts such as validity, reliability and interpretation of assessment evidence. Similar unevenness has been reported by Nwafor et al. (2024), Babatimehin et al. (2025), and Ugwu and Ezeokoli (2022), who

identified differences in teachers' assessment knowledge or practice across areas. In contrast, Zhang and Yan (2018), working with secondary EFL teachers in China, found that a teacher-developed regional assessment functioned satisfactorily overall. The contrast may reflect differences in national context, subject area and method of assessment. In relation to Stiggins' (1991) framework, the weaker perception of measurement theory points to an area central to judging whether assessment is sound or unsound.

The study also found no significant gender difference in STEM teachers' perception of classroom assessment practices. This may reflect shared teacher preparation, assessment policies and professional expectations across male and female teachers. The finding agrees with Abdulmumini (2025) and is also consistent with Babatimehin et al. (2025), who did not identify gender as the main explanation for weak assessment knowledge. However, Mirian and Zulnadi (2020), Khan et al. (2022), Muhson et al. (2025), and Musa (2024) reported gender-related differences in particular assessment constructs. These differences may arise from variations in context, assessment focus and

instrument design. From Stiggins' perspective, assessment literacy is therefore better understood as depending on knowledge and preparation than on gender.

Similarly, no significant difference was found based on subject specialisation. Teachers across Biology, Chemistry, Mathematics and Physics may share similar training, school policies and examination expectations, despite the different assessment demands of their subjects. Hung and Wu (2024) and Yoade and Babatimehin (2025) show that assessment is shaped by disciplinary and curricular demands, while Ergül and Çetin (2021) found significant branch differences in assessment literacy. The contrast may reflect differences in context and instrument design. Within Stiggins' framework, the finding suggests that sound assessment judgement may depend more on assessment knowledge and preparation than on the STEM subject taught.

Limitations

This study relied on self-reported questionnaire responses, so teachers may have rated their perception more favourably than their practice would show. Therefore, the means may overstate the true level of assessment literacy. Convenience sampling means the findings describe the participating teachers and cannot be generalised to all STEM teachers in Kwara and Oyo States. The subject-specialisation groups were also unequal, with fewer Mathematics and Physics teachers than Biology and Chemistry teachers. This imbalance may have reduced the ability of the analysis to detect small differences between subject groups. The length of the original instrument may also have contributed to respondent fatigue. The grouping of items into areas was based on expert content review, not statistical confirmation, so area scores should be read as summaries of related items rather than as separately established constructs.

Conclusion

Secondary school STEM teachers reported an uneven pattern across classroom-assessment areas, with measurement theory lowest among the agreement-based areas and application showing relatively frequent use on its separate scale. Neither gender nor subject specialisation produced a significant difference in assessment-understanding scores. The findings therefore point more to differences across assessment functions than demographic groups, but the self-reported evidence

and predefined questionnaire areas require cautious interpretation.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Ministries of Education and relevant teacher-development agencies should provide regular professional development for STEM teachers, with emphasis on measurement theory, validity, reliability, item analysis and interpretation of assessment results.
2. Trainings should be made available across all STEM teacher groups rather than targeted mainly at particular demographic or disciplinary categories.
3. Teacher-education programmes should strengthen the practical teaching of classroom assessment by linking measurement and evaluation concepts to test construction, interpretation of students' responses and the use of assessment evidence to guide instruction.
4. Future studies should use shorter instruments and combine questionnaire data with classroom observations, interviews or assessment-design tasks to provide stronger evidence of teachers' actual assessment competence.

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