RESEARCH ARTICLE

ASSESSMENT STRATEGIES AND PRIORITIES THAT INFORM THE TEACHING OF INTEGRATED SCIENCE IN PUBLIC AND PRIVATE BASIC SCHOOLS, GHANA

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ABSTRACT

This study focused on the assessment strategies and objectives to be followed for integrated science learning in basic schools within Sunyani municipality. In line with the convergence of parallel mixed methods research design, the study included eleven (11) integrated science teachers from public and private basic schools in the municipality. Data were collected by means of a lesson observation schedule, an interview and a questionnaire. In the analysis of data, standard deviations, T-test and mean scores have been used. The results showed that there were no statistically significant differences in the priorities of integrated science teachers to carry out classroom assessments according to their school type, $P = .735$. However, it was noted that the most frequently used methods of assessment by teachers surveyed were classroom tests, homework and class exercises. Finally, the findings showed that teachers did not use self-assessment or peer comparison in their lessons. Unique contribution to assessment: It was recommended that peer and self-assessment be mandatory in assessing pupils learning to enable them to be part of their own assessment.

INTRODUCTION

A number of issues in education need to be recognised and addressed if teachers are to help their students have meaningful learning experiences. One of these critical issues is the assessment of the classroom. The definition of assessment, which has been called the product of the 20th century, has varied throughout the literature. In addition, Linn and Miller (2005) state that student learning evaluation is an organised process for collecting data on students' progress towards achieving their educational goals. Assessment of the student's learning is performed, which keeps them informed. According to Linn and Miller2005, p. 26, students' performance may be evaluated in a number of ways: traditional paper and pencil tests, extended essays; the ability to perform authentic tasks, teacher observation, and student self-reporting." It is helpful to gauge the success of the teachers' approaches, their ability to ask probing questions, their use of resources, and the language level of their education, regardless of the evaluation strategy employed to gauge the learning of the pupils. In addition, there is a clear

Teachers, however, have different priorities when it comes to the management of assessments in class. Scriven (1967) proposes the use of a "formative and summative" assessment to distinguish between the functions of evaluation or, more precisely, the priorities of evaluation. In the contemporary literature, educators' attention has been drawn to the formation of formative and summative evaluation as two distinct formats (William & Thompson, 2008).According to the authors, the use of assessment to help students learn is the primary function of formative assessment. A formative assessment is a process of continuously assessing students' learning, giving feedback on changes in teaching and learning as well as enhancing the curriculum. On the other hand, a summative assessment is based on evaluations of policies and administrative rulings. According to William (2000), assessment often takes into account "supporting learning (formative), certifying the achievement or potential of individuals (summative), and evaluating the quality of educational instructions or programs (evaluative)". In Black and William 1998 there is a greater emphasis on the use of assessment to improve learning, while acknowledging the value of using evaluation for certification and appraisal.

Teachers are also increasingly in agreement on the use of assessments for classifying children, measuring their performance and detecting academic success, Black & William (1998). On the other hand, some argue that this assessment should be used to improve the learning and performance of students, Delandshere, 2002). Effective teaching is a way of defining learning objectives for students, Amin& Raba, 2017. The aim of teaching is therefore to improve pupils' ability to learn by ensuring a safe, organised and coherent environment focusing on the understanding Lieberman & Maca (2010). This means that students must understand how to make good choices and apply what they learn in the area of problem solving. Therefore, the teaching objectives of teachers have a significant impact on how material is delivered to students in the classroom through the use of appropriate student centered teaching methods. The primary goal of Ghanaian schools' 2012 JHS Integrated Science curriculum is to aid pupils in understanding the natural world via the study of the subject (MoE, 2012). It is therefore expected that students will have an interest in, and a positive attitude toward, science when they understand the scientific ideas presented.This will inspire some of them to pursue additional science education in order to prepare for jobs in science (MoE, 2012). In view of the introduction of the 2012 integrated science curriculum, it is essential for teachers to consider their teaching priorities in relation to how they teach at class level.

Nevertheless, the priorities of integrated science teachers at Sunyani Municipality are diverse in relation to the use of different evaluation methodologies. As previously indicated, some teachers use extended replies (essays), authentic task performance, teacher observation, traditional paper and pencil assessments, and student self-reports for evaluation purposes. Moreover, oral interviews, projects, and homework have been used by several teachers to evaluate the work of their students. Moreover, the priorities of teachers for evaluating their pupils' learning are different. Some teachers evaluate their students to find out what areas they're struggling with in school, while others do it for the purpose of obtaining a grade for their parents or other caregivers to use in their final reports. All of their priorities influence the teacher's choice of assessment technique. The purpose of the study was therefore to find out which assessment approach is most frequently used by integrated science teachers in basic schools, as well as what their main objectives are for carrying out classroom assessments.

The study sought to answer the following research questions:

* What priorities inform the teaching of integrated science in private and public JHS?
* What types of assessment strategies and methods do JHS science teachers use to assess their pupils learning, and how do they conform to the recommended practices in the teaching syllabus?

METHODOLOGY

This section of the study includes demographic data, sampling techniques and research design. The study instrument is also examined and an explanation of the data analysis is provided.

Research design: The convergent parallel mixed methods design was used for this investigation (Creswell & Plano-Clark, 2011; Creswell, 2009; Bazeley, 2004). Quantitative and Qualitative methods were used simultaneously in order to obtain additional information on the assessment methodologies and priorities for teaching Integrated Science at both Public and Private Basic Schools within Sunyani Municipality. A schematic diagram of the convergent parallel mixed techniques design used in this investigation is shown in Figure 1.
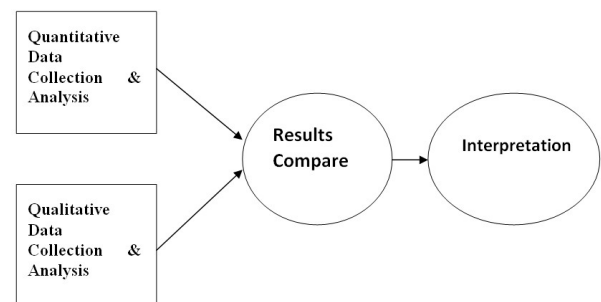

Fig 1. Convergent Parallel Mixed Methods Design (Creswell & Plano-Clark, 2011)

Population and sampling: Teachers of integrated science in basic schools in Bono region were the study's target population. But the teachers of integrated science at basic schools in Sunyani Municipality were the study's participants. The population was divided into public and private strata using a stratified sampling technique. Subsequently, a basic random sampling method by replacement was employed to choose five public schools and three private schools among the 54 and 38 schools, respectively. Convenience played a factor in the number of schools chosen. Additionally, this was done to give schools distinctive qualities. The study included participation from all of the Form 2 integrated science teachers. Because there were fewer teachers teaching in the area, the goal was to guarantee subject adequacy.

Research Instrument: The tools used for the collection of data were questionnaires, interviews, lesson observations schedules and checklists. Written materials such as diary entries, student activity books and recording of lessons for teachers have been used to complement the data obtained from those basic instruments.

Validity and Reliability of the instrument: Some experienced researchers in the municipality were provided the tools, questionnaire, lesson observation, and interview schedule for feedback. After the surveys were given to five teachers in each of the two JHS categories, their reliability was confirmed. The Cronbach's alpha coefficient of reliability was utilized to measure the internal consistency of the items. Reliability coefficients were determined for each variable of the questionnaire because it had multiple dimensions. Priorities for teaching integrated science were 0.73 and classroom assessment strategies were 0.84. Because the instruments' estimated reliabilities were higher than the minimum threshold value of 0.70 suggested for research work (Sirem& Çatal, 2022; Cohen, Manion, & Morrison, 2007; Borg, Gall, and Gall, 1996), it was determined that the instruments were internally consistent and suitable for data collection. The inter-rater percentage reliability was used to evaluate the lesson observation protocol's dependability. For

every item, the inter-rater percentage dependability values obtained varied from 75% to 100%. As advised for study work, these percentages above the minimum benchmark agreement value of 75% (Baysal & Mutlu, 2021; Eser & Aksu, 2022). It was determined that the device was suitable for gathering data as a result.

Data Analysis: Using IBM SPSS version 26, a number of statistical techniques were used to analyze the quantitative data obtained from the surveys. These techniques included descriptive statistics like mean and standard deviation as well as inferential statistics like a T-test. Based on predetermined subheadings pertaining to the study topics, the analysis was completed. Each qualitative piece of information obtained from the interviews and lesson observations was examined separately. The researchers read over each interview's transcript using the constant comparative technique of analysis (McGonagle, Bardwell, Flinchum, & Kavanagh, 2022) to gain an understanding of how distinctive each tale was. Sentence by sentence, every transcript was examined closely to find words and phrases that reflected a certain idea and were descriptive. When reading the transcript, key themes emerged. The outcomes were then contrasted to see if the teachers' interviewee statements matched the practices they used in the classroom.

RESULTS AND DISCUSSION

This section presents the results and discussions of the study.

Research Question 1: What priorities inform the teaching of integrated science in private and public JHS?

A five-point Likert-type scale ranking integrated science teachers' priorities for conducting classroom assessment consists of four items. The mean and standard deviation of each of the four items soliciting the teachers' views were calculated. The mean scores were used to rank the priorities. The facial expressions of the teachers' responses to the questionnaire items were analyzed using the mean scores below: 1.80.------- 2.59 = Never, 2.60.------- 3.39: Very rarely, 3.40----3.44 = Undecided, 3.5----4.19 = Almost always, and 4.2----5 = Always.

Table 1: Integrated science teachers' priorities for conducting classroom assessment

| Item | School type | | |
| | Public | private | |
	M/SD	M/SD	Average M/SD
1.Grading and filling report to parents	2.83/1.323	3.20/1.10	3.02/1.21
2.Feedback on pupils learning	3.17/1.33	3.00/1.41	3.08/1.37
3.Identifying pupils learning difficulties	3.33/1.03	3.00/1.41	3,17/1.22
4.To inform the teaching of integrated Science	3.17/1.33	3.40/1.52	3.28/1.42

The results in Table 1 show that there were multiple reasons for conducting classroom assessment, with average mean scores of the teacher's responses to the items ranging from 3.02 (SD = 1.21) to 3.28 (SD = 1.42). This indicates that all the teachers sampled for the study from both school types very rarely conduct assessments to inform the teaching of integrated science, the identification of pupils learning difficulties, getting feedback on pupils learning, and getting marks to grade and fill out reports to parents. However, the mean scores for the views of the public-school teachers

ranged from 2.83 (SD = 1.32) to 3.33 (SD = 1.03), compared to 3.00 (SD = 1.41) to 3.40 (SD = 1.52) for the private school teachers. Generally, this also suggests that the teachers very rarely conduct assessment to inform the teaching of integrated science, identify pupils learning difficulties, get feedback on pupils learning, and get marks to grade and fill out reports to parents. To find out whether the teachers from public and private basic schools sampled differed in their priorities for the conduct of classroom assessment, the mean scores of their views were computed and presented in Table 2.

Table 2. Differences in priorities in conducting assessment based on school-type

School type	N	Mean	Std. Deviation	Std. Error Mean
Public	6	12.50	3.83	1.57
Private	5	12.60	4.04	1.81

From Table 2, the overall mean score for the views of the public and private JHS teachers was 12.50 (SD = 3.83) and 12.60 (SD = 4.04), respectively. This suggests that the public and private JHS Integrated Science teachers in Sunyani municipality had different priorities for conducting classroom assessments. Further research was carried out using an independent-samples t-test to find out whether the difference in priorities is significant. To do this, reasons such as to grade and fill out report cards for parents, give students feedback on their learning, identify students' learning difficulties, and inform the teaching of integrated science served as the dependent variables. The independent variable used was school-type. The result of the independent-samples t-test is presented in Table 3.

Table 3. Results of independent sample t-test analysis on mean school type and priorities in conducting assessment

Group	N	Mean	s.d.	Df	T	Level of sig
Public	6	3.12	1.26	9	-0.111	0.735
Private	5	3.15	1.36			

From Table 3, the mean score for the public-school teachers' priorities for conducting classroom assessment was 3.12 (SD = 1.26), while that of the private school teachers was 3.15 (SD = 1.36). The analysis revealed no statistically significant difference between the two groups; t (9) = -0.111, p > 0.05.

Table 4. Assessment Strategies

| Item | School Type | | |
| | Public | private | |
	M/SD	M/SD	
1 Homework	4.50/.55	4.40/.55	
2 Class exercise.	5.00/.00	4.80/.45	
3 Class test	4.33/.52	5.00/.00	
4 Project work	3.33/1.03	3.60/1.52	
5 Peer assessment	2.17/1.47	2.40/1.95	
6 Group Work	4.00/1.10	4.00/1.23	
7 Self-assessments	1.50/1.23	2.20/1.64	
8 Oral interviews	3.33/1.86	3.00/1.87	

These results suggest that there was no statistically significant difference between the JHS Integrated Science teachers' priorities for conducting classroom assessments based on school type.

Table 5. Documentary analysis of JHS Integrated Science teachers' lessons

Teacher	School-type	Number of lessons done	A	B	C	D	E	F	G	H
Teacher 1	Public		1	2	1	0	0	0	1	0
Teacher 2	private		2	1	2	0	0	0	0	0

NOTE: A= Homework, B= Class Exercise, C= Class Test, D= Self- assessment,
E= Peer assessment, F=Project Work, G= Group Work and H= Oral Interview

The findings of the study confirm those of Black and William (1998). Black and William (1998) found that teachers' judgments about student performance were strongly influenced by factors such as the students' motivation and behaviour in class. Additionally, Hattie (2008) argued that many teachers focus on the 'comfort' of the assessment process rather than its accuracy.

Research Question 2: What types of assessment strategies do JHS integrated science teachers use to assess their pupils learning, and how do they conform to the recommended practices in the teaching syllabus?. The question sought to investigate the types of assessment methods and strategies JHS Integrated Science teachers in the Sunyani municipality use to assess their pupils' learning. Descriptive statistics were used to organize the teachers' responses to the questionnaire items into means and standard deviations. The expressions of the teachers on the dimensions of the assessment strategies were categorized using the mean scores indicated below. 1.80-------2.59 = not at all; 2.60-------3.39 = occasionally; 3.40----3.44 = undecided; 3.5----4.19 = frequently; and 4.2---5 = very frequently.

The mean responses of public and private JHS teachers to the assessment strategies they used to assess their pupils' learning in the subject ranged from 1.50 (SD = 1.23) to 5.00 (SD =.00). Meanwhile, the mean scores for the private school teachers ranged from 2.20 (SD = 1.64) to 5.00 (SD =.00), as opposed to 1.50 (SD = 1.23) to 5.00 (SD =.00) for the public-school teachers. Generally, as indicated in Table 4, the most frequent assessment strategies teachers sampled for the study from both school types used to assess their pupils' learning were class exercise and class test, with a mean score of 5.00 (SD =.00) for each. However, the private school teachers indicated that they very frequently assess their pupils' learning using class exercises, class tests, and homework, resulting in mean scores of 4.80 (SD =.45), 5.00 (SD =.00), and 4.40 (SD =.55), respectively. With mean scores of 2.20 (SD = 1.64) and 2.40 (SD = 1.95), the private school teachers also stated that they did not use self-assessment or peer assessment to monitor their pupils' learning. The teachers also stated that they frequently used homework to monitor their pupils' progress, yielding a mean of 4. 40 (SD = .55). On the other hand, the data in Table 4 show that the public JHS teachers very frequently used class exercises, class tests, and homework to assess their pupils, with means of 5.00 (SD =.00), 4.33 (SD =.52), and 4.50 (SD =.55), respectively. They further indicated that they do not at all use self-assessment (mean: 1.50; SD: 1.23) or peer assessment (mean: 2.17; SD: 1.47) to assess their pupils. To gain deeper insights into what classroom assessment strategies JHS Integrated Science teachers use and how they conform to what is suggested in the Integrated Science syllabus, a documentary analysis of a teacher from each type of school was used as a case study. The lessons of the teachers used as a case study were recorded for two consecutive meetings each on the 6th and 7th weeks of the third term of the 2022–2023 academic year with field notes.

The students' exercise books, lesson notes, and work schedules were observed to accomplish this. The purpose was to obtain information on the types of classroom assessment strategies used by the teachers. Results in Table 5 show that out of the two integrated science lessons delivered by each teacher from both school types, the teacher from the private school gave more homework and class tests compared to the one from the public school. However, the teacher from the public school conducted more class exercises compared to the teacher from the private school**.** The public-school teacher also used group work as a mode of assessment, whereas the private-school teacher did not. The documentary analysis's findings corroborated the methods of classroom evaluation that Integrated Science teachers had indicated in their survey responses. In the schools that were used for the case study on classroom assessment strategies, the researchers spoke with the teachers and a few chosen students from their classes. An excerpt from their answers is as follows:

"As a teacher, I have to give class exercises and homework to monitor pupils' understanding of lessons to see whether they have understood. "Self-assessment is a waste of time."
(Public school teacher)

Responses from focus groups including a subset of chosen students from a public-school teacher's class included:

"Our teacher has given us project work before, but we have never done any self- or peer-evaluation before."

The public school's students' and teacher's opinions support the decision to completely forgo using peer and self-evaluations in order to gauge students' growth.

"Giving class exercises, a class test, and homework to my students is the surest way to know my pupils understood what happened in the classroom."
(Private school instructor)

However, a focus group discussion including students from the teachers' class at the private school disclosed that:

"Our science teacher gives us class exercises and homework anytime we do science"

As a result, the teacher's and students' opinions were consistent with the private basic school's practice of assigning homework and doing in-class exercises as a kind of evaluation. The JHS Integrated Science syllabus and the classroom assessment procedures employed by the teachers were compared in order to investigate the degree to which the syllabus and the practices of the integrated science teachers were aligned. First of all, the syllabus does not provide a deadline for teachers to adhere to, despite the fact that it makes clear that homework and in-class activities are vital to teaching and learning. Only frequent use was advised for the teachers.

In contrast to the public-school teacher's practice of frequently using in-class exercises as a mode of assessment, this may have led to a situation where the Integrated Science teacher from the private basic school sampled indicated that he used homework as an assessment strategy. Based on their practices, teachers from both types of schools appear to monitor their students' learning through classroom assessments. While only the private school instructor reported using class tests as an assessment tool, the case study results support the survey results. This is not the same as the two-class exams that instructors were supposed to administer when the information was collected from the schools. Class assessments are to be given in schools on the fourth, eighth, and eleventh weeks, per the Teachers' Handbook for School-Based Assessment (SBA) (MoE, 2012). However, since none of the teachers used projects as a form of assessment, it appears from the documentary analysis that the integrated science teachers selected do not follow the syllabus's grading guidelines for classroom assessment (MoE, 2012). Therefore, the integrated science instructors' classroom assessment techniques from the tested schools did not align with the 2012 JHS integrated science curriculum standards (MoE, 2012).

Conclusions and Recommendations: This section presents conclusions and recommendations of the study.

CONCLUSION

The teacher's failure to employ peer and self-assessment in their classes may be due to their credibility as far as assessment is concerned. However, the teachers' priorities for conducting classroom assessments were influenced by their expectations of assessment.

RECOMMENDATION

Since the teachers indicated that they did not use peer and self-assessment in their classes, the study recommends that the teachers from the sampled schools be encouraged to use them to enable the pupils to be part of their own assessment.

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