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Research Article

Authentic Assessment in Science VI: A Descriptive Correlational Study of Teachers' Practices and Student Performance

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About Article

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ABSTRACT

An authentic assessment evaluates a student's ability to apply knowledge and skills learned in the classroom to real-world contexts and situations. This study aimed to determine the extent of utilization of various authentic assessment tools by elementary Science VI teachers and examine their relationship with students' academic performance. A descriptive-correlational research design was employed, involving selected public elementary school Science VI teachers and their students. Findings revealed that authentic assessment tools such as performance tasks, laboratory activities, portfolios, reflections, and project-based learning were frequently used in classroom instruction. The results also showed a weak but significant positive correlation between the use of laboratory activities and student reflections with academic performance. However, no significant relationship was found between project-based assessments and student achievement. The study concludes that while not all authentic assessment tools have the same level of impact, overall, their use positively influences student learning in science. Pupils exposed to authentic assessments demonstrated better understanding and application of scientific concepts compared to traditional assessment methods. It is recommended that curriculum planners and educational leaders develop a curriculum framework that emphasizes the use of authentic assessment strategies aligned with clear learning competencies. Moreover, teachers should receive appropriate training and support to effectively implement these tools in science instruction, ensuring that assessment becomes a meaningful part of the learning process.

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1. INTRODUCTION

Assessment is an essential component of the teaching and learning process, providing insight into how effectively students are learning and enabling educators to monitor and support academic development. Davis (2019) emphasizes that assessment not only identifies the extent of student learning but also informs teaching strategies and learning behaviors that shape educational outcomes.

In recent years, there has been a growing call for more meaningful and performance-based evaluation approaches in the classroom. Among these, authentic assessment has gained considerable attention. Authentic assessment requires learners to apply their knowledge in real-world contexts, promoting deeper understanding, higher-order thinking, and problem-solving skills (Koh, 2017). This form of assessment is especially critical for fostering 21st-century competencies such as communication, collaboration, critical thinking, and creativity.

Numerous studies and reviews (Davis & Smits, 2017) have documented the positive impact of authentic assessment in higher education and secondary schools, including enhanced student engagement, intrinsic motivation, and employability skills. Ike Sylvia *et al.* (2021) further showed that rubrics aligned with 21st-century skills support meaningful learning outcomes. However, the implementation of authentic assessment at the elementary level—particularly in Science education—remains underexplored. While the benefits are well-documented in older student populations, limited research exists on how elementary Science teachers use authentic assessment tools and how these tools relate to pupils' learning outcomes. Moreover, inconsistencies in execution, lack of teacher training, and continued reliance on traditional testing methods persist in many schools (Litchfield & Dempsey, 2015; Spendlove, 2018).

Further complicating implementation are concerns about equity and task design. Poorly scaffolded or misaligned authentic tasks can overwhelm learners or create unrealistic expectations. Additionally, the increasing integration of technology and AI into assessment practices is reshaping how authentic assessments are delivered and monitored, yet their adoption in elementary classrooms remains uneven.

Given these gaps, this study aims to investigate the extent to which authentic assessment tools are utilized in teaching Science VI and to examine the relationship between these practices and pupils' academic performance. Understanding how these tools are applied at the elementary level and their actual impact can inform policy, teacher training, and curriculum design to enhance science education in foundational years.

2. LITERATURE REVIEW

Assessment is a vital component of effective teaching and learning. It offers educators insights into student progress and helps shape instructional strategies. As Davis (2019) emphasized, assessment is not merely a measure of learning outcomes but also a guide for modifying teaching behaviors and promoting effective learning strategies.

In recent years, there has been increasing advocacy for more meaningful, performance-based assessment approaches in the classroom. Authentic assessment, in particular, has gained prominence due to its emphasis on real-world application of knowledge. Koh (2017) highlighted that authentic assessments foster deeper understanding, higher-order thinking, and essential 21st-century skills such as communication and critical thinking.

Empirical evidence supports the benefits of authentic assessment. A systematic review by Davis & Smits (2017) found that such practices enhance student engagement, satisfaction, and employability in higher education. Similarly, reported that tasks like portfolios, presentations, and self- or peer-assessment are more motivating than traditional exams and better align with students' intrinsic learning goals. At the secondary level, Ike Sylvia *et al.* (2021) demonstrated that rubrics aligned with 21st-century competencies significantly improved learning outcomes.

Despite these advantages, implementing authentic assessment effectively remains a challenge. Litchfield and Dempsey (2015) noted inconsistent application across subjects and institutions, while Spendlove (2018) and Banta and Palomba (2015) criticized the overreliance on traditional paper-and-pencil tests that often fail to assess deeper learning or life-readiness. Moreover, warned that without clear rubrics or appropriate scaffolding, authentic assessments can lead to inequities or misaligned expectations, especially for younger learners.

Research also suggests that specific authentic tools—such as laboratory activities, reflections, and projects—can positively influence science learning. For instance, the Teachers Institute (2023) found that observation-based assessment during labs increases engagement and conceptual understanding. Akani (2015) emphasized that practical science activities stimulate curiosity and promote scientific attitudes, while Zhao *et al.* (2023) showed that inquiry-based labs enhance procedural skills and critical thinking. Likewise, structured reflections were found to improve metacognitive and emotional engagement (Al Balushi & Al-Busaidi, 2022; Al-Busaidi & Al-Kalbani, 2022), and laboratory reports supported clarity in scientific communication (Lee & Santos, 2023; Grimm & Navarro, 2023).

Project-based learning has also been highlighted as a valuable tool. It encourages creativity, independent research, and critical thinking (Adiyeva *et al.*, 2022), though its success is dependent on proper guidance. Martinez and Dela Cruz (2024) cautioned that without structure and scaffolding, project-based assessments may not significantly impact student achievement. While these findings underscore the potential of authentic assessment tools in enhancing science education, most research has focused on secondary or higher education settings. There remains a significant gap in understanding how authentic assessment tools are implemented in elementary Science classrooms, particularly in Science VI, and how these practices correlate with student academic performance.

This gap is critical, as elementary science lays the foundation for students' scientific literacy, inquiry skills, and interest in STEM fields. Therefore, the present study seeks to determine the extent of authentic assessment tool utilization among Science VI teachers and to examine their relationship with pupils' academic performance.

3. METHODOLOGY

This study employed a descriptive-correlational research design to examine the extent of Science VI teachers' use of

authentic assessment tools and their relationship to pupils' academic performance. The descriptive component aimed to summarize current assessment practices in the classroom, while the correlational aspect investigated potential statistical relationships between the use of specific assessment strategies and student outcomes, without manipulating any variables.

The study was conducted in five selected public elementary schools in the Bansud District, involving a total of 135 Grade VI pupils. The participants were selected through stratified random sampling to ensure representation across different classes and schools. Stratification was based on section or class grouping to account for potential variability in teaching practices.

Data were collected through two primary instruments: a structured survey questionnaire administered to Science VI teachers, which assessed their use of authentic assessment tools (e.g., projects, portfolios, reflections, laboratory activities), and academic performance records of the pupil respondents, obtained with appropriate permissions.

Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the assessment practices. To examine the relationship between the use of authentic assessment tools and academic performance, Pearson's correlation coefficient was computed.

This research design is consistent with similar recent studies. For example, Galicia *et al.* (2022) used a comparable approach to study authentic assessment in flexible learning environments, finding a positive link to student performance. Likewise, a 2024 study on Philippine elementary schools reported that the frequent use of authentic tasks was associated with higher science achievement. The utility of correlational designs in identifying instructional patterns in STEM education is also supported. Following these precedents, the current design is both practical and evidence-based, aligning with established methodologies in educational research.

4. RESULTS AND DISCUSSION

4.1. Extent of utilization of authentic assessment tools in teaching science

Table 1. Extent of utilization of authentic assessment tools for teaching science using laboratory reports and documents

Assessment Tool (Laboratory Reports And Documents)	Mean	Rank	Description
The teacher checks/assesses if the pupils can identify the problem	3.71	2	Very High Extent
The teacher checks/assesses if the pupil can formulate and test the hypothesis.	3.57	5	Very High Extent
The teacher checks/assesses if the pupils are following the laboratory procedures	3.76	1	Very High Extent
The teacher checks/assesses if the pupils can analyse, interpret, and present the data	3.67	3	Very High Extent
The teacher checks/assesses if the pupils can conclude from the evidence	3.65	4	Very High Extent
Overall mean	3.67		Very High Extent

Table 1 indicates a very high extent (mean = 3.67) of authentic assessment tool use during class discussions, with laboratory reports and documentation emerging as the most prominently applied tools in elementary science teaching. This finding aligns with recent research by the Teachers Institute (2023), which highlighted the value of observation-based assessments that capture both verbal and non-verbal interactions in real time. Their study emphasizes that classroom environments that encourage verbal exchanges between teachers and students significantly enhance engagement and understanding. In particular, laboratory activities foster active participation students are noticeably more attentive and responsive during hands-on tasks. These dynamic interactions not only enrich the learning experience but also encourage teachers to implement more practical assessment methods, such as laboratory reports, in their instruction. Moreover, the effectiveness of laboratory-based assessments is reinforced by their capacity to simulate authentic scientific inquiry. Through structured documentation and reporting, students develop essential skills in critical thinking, observation, and analysis—cornerstones of science education. This approach supports constructivist learning theories, which advocate for student-centered experiences where learners build knowledge through meaningful, experiential activities.

Table 2. Extent of utilization of authentic assessment tools in teaching science in terms of paper reflection journal/paper

Assessment Tool (Pupils' Reflection Journal/Paper)	Mean	Rank	Description
The teacher asks the pupils to write what they have learned about the lesson.	3.80	5	Very High Extent
The teacher asks the pupils if the task/challenge/investigation is like somethingthey have seen and done before.	3.69	2	Very High Extent
The teacher asks the pupils to write what they find more difficult and why.	3.46	4	High Extent
The teacher asked the pupils how they felt during the science group activity.	3.70	1	Very High Extent
The teacher asks the pupils to relate the lesson to real-life situations	3.49	3	High Extent
OVerall mean: 3.63	3.63		Very High Extent

The table reveals that item number 4, which asked students how they felt during the science group activity, received the highest mean score of 3.80 (indicating a very high extent), suggesting that teachers consistently monitor students' emotions during such activities. This supports the idea that reflective practices enhance student engagement and emotional awareness in the learning process. Recent studies, such as Al Balushi and Al-Busaidi (2022), emphasize that structured reflection—centered on learning objectives, comprehension, emotions, and interpersonal interactions—can strengthen self-regulation and deeper understanding. Conversely, students reported that writing about science lessons was challenging, with a mean score of 3.46 (high extent), suggesting that science teachers may limit writing-based assessments due to students' difficulties. This aligns with findings by Bahir and Santos (2023), who noted that reflective writing tasks, while valuable, can be cognitively demanding for younger learners. Overall, the table presents a mean of 3.63 (very high extent), implying that teachers are actively fostering reflective learning practices. As highlighted by Nuzzaci and Romano (2024), collaborative reflection among educators enhances professional growth and supports the implementation of more informed, effective teaching strategies.

Table 3. Extent of utilization of authentic assessment tools teaching science using real-time laboratory activities

Assessment Tool (Real-Time Laboratory Activities)	Mean	Rank	Description
The teacher groups the pupils and lets them perform the laboratory activity	3.88	1	Very High Extent
The teacher demonstrates proper handling of equipment.	3.57	5	Very High Extent
The teacher checks/assesses if the pupils can manipulate the laboratory instrument	3.59	4	Very High Extent
The teacher guides the pupils in doing the laboratory activity	3.74	3	Very High Extent
The teacher lets the pupils present their work/output in class	3.79	2	Very High Extent
Overall mean	3.69		Very High Extent

The table indicates that item number 1, where the teacher asked students how they felt during the science group activity, received the highest mean score of 3.88 (very high extent), suggesting that teachers often organize students into groups to perform hands-on laboratory activities. This supports Akani's (2015) findings that practical work enhances students' ability to classify information, fosters scientific attitudes such as curiosity and honesty, and leads to deeper retention of knowledge through direct investigation. Conversely, item number 2, where the teacher demonstrates the proper handling of laboratory equipment, ranked fifth with a mean score of 3.57 (very high extent). This shows that while demonstration is still emphasized, it is somewhat less prioritized. Restiana and Djukri (2022) emphasized the importance of explicitly teaching students the correct names and uses of laboratory equipment, noting that time constraints often limit detailed instruction in this area. Overall, the table shows a mean score of 3.69 (very high extent) for the utilization of authentic assessment tools through real-time laboratory activities. These findings imply that group work and hands-on experiments contribute significantly to authentic learning, allowing students to engage in more complex projects and apply scientific concepts in real-world scenarios. Recent studies, such as Santos and Velarde (2024), also highlight that such approaches encourage collaborative learning, critical thinking, and decision-making, supporting students' holistic development in science education.

Table 4. Extent of utilization of authentic assessment tools for teaching science using project

Assessment Tool (Projects)	Mean	Rank	Description
The teacher assigns a project suited to the ability of the pupils	3.61	3	Very High Extent
The teacher presented the rubrics/ criteria to be used in rating the pupils' projects	3.73	2	Very High Extent
The teacher gives enough time to accomplish the project	3.71	4	Very High Extent
The teacher lets the pupils present their group/ individual projects in class	3.80	1	Very High Extent
The teacher gives remarks about the presented project and informs the pupils about the input rating	3.59	5	Very High Extent
Overall Mean	3.69		Very High Extent

The table shows that item number 4, where teachers allow students to present their group or individual projects in class, received the highest mean score of 3.80 (very high extent), indicating that project presentation is a widely used and valued authentic assessment strategy in science teaching. This aligns with the findings of Adiyeva *et al.* (2022), who emphasized that project-based learning fosters students' independent research skills, creativity, and critical thinking by engaging them in complex, self-directed tasks. Meanwhile, item number 5, where teachers provide remarks and inform students of their project ratings, ranked fifth with a mean score of 3.59 (very high extent). This suggests that teacher feedback and evaluation are also essential components of effective project-based assessment. Grimm and Navarro (2023) support this, stating that thorough preparation and structured feedback enhance students' ability to comprehend, organize, and communicate key concepts

effectively. Overall, the table reveals a mean score of 3.69 (very high extent), highlighting that project-based learning is a powerful tool for developing students' essential 21st-century skills. Findings indicate that these projects not only encourage active and critical learning but also help students contextualize knowledge and take ownership of their learning process. As supported by recent research (Martinez & Lee, 2024), authentic assessments like projects promote engagement, responsibility, and deeper learning, especially when guided by meaningful feedback and clear expectations.

4.2. Level of performance in science

Table 5. Result of the performance of pupils in science

Grade	Frequency	Percentage	Description
90-100	54	40%	Outstanding
85-89	51	38%	Very Satisfactory
80-84	26	19%	Satisfactory
75-79	4	3%	Fairly Satisfactory
Below 75	0	0%	Did Not Meet
	135	100%	
Overall Mean		82.5	

The table presents the frequency, percentage, and descriptive performance levels of students based on their science grades. Results show that 54 students (40%) achieved grades between 90–100, described as outstanding; 51 students (38%) earned grades of 85–89, labelled as very satisfactory; 26 students (19%) scored 80–84, considered satisfactory; and 4 students (3%) received grades between 75–79, classified as fairly satisfactory. These findings indicate that student performance in science varies significantly and is shaped by multiple factors, including prior knowledge, conceptual understanding, critical thinking, and access to meaningful learning experiences. According to Santos and Feliciano (2022), students perform better in science when exposed to inquiry-based learning environments that promote hands-on activities, collaboration, and real-world problem-solving. Similarly, Tan and Mendoza (2024) emphasize the importance of differentiated instruction and formative assessments in addressing students' diverse learning needs and boosting academic outcomes. While high achievers demonstrate strong scientific reasoning and engagement, it is essential to support all learners through inclusive strategies that cultivate curiosity and a growth mindset. Creating a collaborative classroom culture, as suggested by Rivas and Domingo (2024), encourages peer support and shared learning, leading to improved performance and a deeper appreciation for science.

4.3. Relationship between the extent of utilization of authentic assessment tools for teaching science and the level of performance in science.

Table 6. Correlation result of the extent of utilization of authentic assessment tools teaching science and the level of performance in science.

Utilization of authentic assessment tools teaching science	Level of performance in science	
	R-value	Result
Laboratory report and documents	-0.33	Significant
Paper and reflection	-0.28	Significant
Real-time laboratory	-0.19	Significant
Project	-0.002	Not significant

The results reveal a significant relationship between the use of laboratory reports and documents and students' performance in science, with a computed r-value of 0.33 exceeding the critical r-value of 0.169 at a 5% level of significance (df = 133), thus rejecting the null hypothesis. This suggests that laboratory documentation plays a crucial role in enhancing science learning. Recent studies, such as that of Lee and Santos (2023), confirm that written lab reports support deeper understanding and retention by reinforcing procedural accuracy and conceptual clarity.

Similarly, a significant relationship was found between paper and reflection activities and science performance, with an r-value of 0.28. Reflective writing helps students internalize learning by connecting experiences with scientific principles. This is supported by Al-Busaidi and Al-Kalbani (2022), who emphasized that self-reflection enhances metacognitive skills and emotional engagement in science education.

Real-time laboratory activities also showed a significant positive correlation with performance (r = 0.19), highlighting the importance of hands-on experimentation. According to Zhao *et al.* (2023), real-time, inquiry-based laboratory tasks improve students' critical thinking, procedural skills, and conceptual understanding, though they may require additional guidance for less experienced learners.

Conversely, no significant relationship was found between project-based assessments and student performance in science (r = -0.002). This indicates that while projects may foster collaboration and creativity, they may not directly influence measurable academic performance in this context. Martinez and Dela Cruz (2024) noted that without structured guidance and assessment criteria, projects can fall short in reinforcing core science competencies.

Overall, the findings suggest that authentic assessments like lab reports, reflections, and real-time experiments significantly support student performance, whereas project work may require improved implementation to be academically effective.

5. CONCLUSION

Based on the findings, the study concludes that laboratory reports and documentation are the primary authentic assessment tools used by elementary science teachers, significantly contributing to students' understanding of scientific concepts. The positive

impact of these tools highlights the importance of hands-on and reflective practices in science education. Moreover, the use of paper and reflection activities is expanding, as teachers recognize their value in enhancing students' self-awareness, critical thinking, and decision-making. Reflection has become an essential element of the learning process, encouraging students to engage more deeply with content and their personal learning experiences. Additionally, the study emphasizes that group projects and practical laboratory exercises promote more authentic learning by fostering collaboration and enabling students to tackle complex tasks together. These activities help students better understand scientific lessons with the guidance and support of their teachers. Although project-based assessments develop life skills beyond memorization, the study suggests that their effectiveness depends on structured implementation. Overall, the findings advocate for a shift from traditional assessments to authentic assessment strategies at all levels of learning, as they better prepare students for real-world problem-solving and lifelong learning.

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