

Laboratory Resource Availability and Instructional Strategies in Relation to Students' Academic Performance

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ABSTRACT

This study explored the availability of laboratory resources, the implementation of instructional strategies, and their relationship to learners' academic performance in the Calamba District of Calamba, Misamis Occidental. A descriptive correlational research design was employed with 120 public elementary and secondary school teachers. Data were gathered using a structured research instrument, and descriptive statistics, including mean and standard deviation, assessed levels of resource availability and instructional strategy implementation. Pearson's Product-Moment Correlation Coefficient (Pearson r) was used to examine relationships between the independent variables and learners' academic performance. Findings revealed that teachers perceived laboratory resources as highly available and reported consistently high implementation of instructional strategies. Learners' academic performance was generally above average. However, no significant relationships were found between laboratory resource availability or instructional strategy implementation and learners' academic outcomes. The study concludes that while schools provide ample resources and effective teaching strategies, these factors alone do not directly determine academic performance, highlighting the need for complementary student engagement and support mechanisms. School administrators and teachers may collaboratively maintain laboratory resources, strengthen instructional practices, and support learners through targeted interventions, while future studies explore how effective resource use and teaching strategies impact academic performance.

Keywords: academic performance, instructional strategies, laboratory resources, learning outcomes, teacher perceptions

INTRODUCTION

The availability of laboratory resources remains a foundational element of effective science education, giving students active experiences that anchor theoretical understanding. Recent studies have emphasized that well-equipped laboratories greatly enhance the development of conceptual clarity, practical skills, and problemsolving competencies among learners (Cabusor & Antonio, 2024; Abbey-Kalio, 2024). The disparities in the provision of laboratory facilities across contexts, including Nigeria and the Philippines, have been noted in the literature. Such disparities have been linked to lower levels of student achievement and fewer opportunities for hands-on engagement in science. These findings therefore reinforce the long-standing assertion that adequate laboratory infrastructure is critical in securing meaningful learning outcomes in science subjects.

Empirical evidence has shown that the availability of laboratory resources is positively correlated with increased student engagement, a necessary precursor to academic achievement. According to Lazaro & Paglinawan (2024), there was a reasonably strong correlation between the adequacy of available laboratory resources and Grade 12 students' engagement, indicating that material support translates into active participation and deeper involvement in scientific tasks. Taken together, other research indicates that students in resource-rich laboratory settings performed better than peers without access to essential laboratory tools and materials (AbbeyKalio, 2024; Cabusor & Antonio, 2024). These findings affirm that adequate laboratory resources not only enhance the quality of instruction but also strengthen students' academic readiness and performance.

Other critical determinants of student learning outcomes include the instructional strategies used to enhance learning, especially in settings where laboratory activities are part of the core curriculum. As several studies have noted, the availability of laboratory resources alone does not guarantee better performance; how the teacher uses these facilities or resources determines the degree of usefulness students derive from them (Rabanés & Paglinawan, 2025; Abbey-Kalio, 2024). Good instructional practices include organizing activities with a practical focus, scaffolding tasks, and providing opportunities for productive interactions that facilitate student exploration. For instance, research in Ghana found that blended instruction approaches, combining online and face-to-face modalities, positively influence student achievement, underscoring the role of multimodal pedagogies in enhancing learning.

Additional findings from the Philippines indicate that instructional strategies such as individualized education plans, peer support, and effective classroom management promote student engagement and higher academic performance (Mangila & Mangila, 2024; Anning et al., 2024). These aspects point out that the teacher plays a dual role—not only in knowledge transmission but also in structuring the learning environment to provoke participation, investigation, and self-regulation. Notably, several studies showed that instructional strategies may interact with resource availability, meaning the efficiency of laboratory resources depends on how teachers design and manage the learning process (Lazaro & Paglinawan, 2024; Rabanés & Paglinawan, 2025). This implies that instructional strategies should be considered not just as isolated factors but also as potential moderators that influence or limit the benefits of laboratory resources.

Academic performance, as evidenced by grades, examinations, and standardized tests, indicates learners' ability to integrate, apply, and retain content. Similarly, emerging evidence indicates that students perform better when instructional strategies complement well-managed learning environments (Cinadre, 2023; Anning et al., 2024). Active learning approaches have indeed been associated with high levels of conceptual understanding and knowledge retention, particularly in science subjects that require analytical and practical competencies. This is consistent with many studies showing that students exposed to resource-rich laboratories and effective teaching practices perform above average compared to those in less supportive learning conditions.

In addition, student engagement and the extent to which learners participate in practical activities significantly influence academic performance. Indeed, evidence shows that better learning is achieved when access to facilities supports real investigations and inquiry-based experimentation. Some recent studies, however, caution that access to laboratories alone does not guarantee improved academic performance because ineffective pedagogy or a lack of guidance can limit learner gains even when resources are adequate (Rabanés & Paglinawan, 2025; Lazaro & Paglinawan, 2024). These findings indicate that academic performance is best conceptualized as an interaction between material conditions and instructional quality and highlight the importance of examining both variables together.

Although related research has examined the impact of laboratory resource availability and instructional strategy on academic performance, no prior study has examined these variables as an integrated whole. Not much research has examined the combined effect of laboratory resource adequacy and instructional strategy on student outcomes, particularly in local and developing-country contexts where laboratory access remains limited (Lazaro & Paglinawan, 2024; Rabanés & Paglinawan, 2025). Furthermore, there is limited empirical evidence on how teachers adapt their instructional strategies to the adequacy or inadequacy of laboratory resources. This leaves a gap in the understanding of how physical resources dynamically relate to pedagogical approaches.

The study first and foremost fills a theoretical gap by exploring the interaction between laboratory resource availability and instructional strategies, two variables usually treated in isolation in the literature. Second, it addresses an empirical gap by providing context-specific evidence from under-researched educational settings. Finally, it addresses a methodological gap by combining analyses of resource availability, instructional strategies, and academic performance within a single framework. This study examines the relationships among laboratory resource availability, instructional strategies, and student academic performance. It seeks to identify how these two variables, singly and interactively, influence learning outcomes in a selected educational context, offering a more holistic understanding of the factors affecting student achievement.

It aims to establish the extent to which laboratory resources and instructional strategies contribute to student performance, and whether their combination or interaction yields more potent effects than when each is considered in isolation. By doing so, the study aims to provide insights relevant to pedagogical practice and resource allocation decisions in schools. The empirical evidence from this study will help school administrators make informed decisions about resource allocation, laboratory development, and teacher training. Results may corroborate decisions to focus investment either on laboratory facilities or on pedagogical programs that maximize the use of existing resources.

Teachers benefited from insights into how different instructional strategies interact with resource availability, enabling them to refine their approaches to optimize student learning even in resource-constrained environments. Similarly, students would benefit from an improved learning environment and enhanced instructional quality, which could lead to greater engagement, deeper understanding, and improved academic performance. These findings could help policymakers formulate education policies that holistically improve science instruction by jointly addressing material resources and teaching quality. The study further contributes to the research community, particularly to the development of education systems in developing countries, by broadening the current knowledge base on the interplay between resources and pedagogy. Results from the study could support the development of school development plans, faculty development programs, and curriculum design. Schools can adopt it to improve laboratory-use policies, design teacher-training modules, and implement strategic resource-management practices. Policymakers and curriculum planners can use it to develop integrated frameworks that align resource provision with instructional innovation to improve students' academic outcomes.

METHODS

This study utilized a descriptive correlational research design to examine the relationships among laboratory resource availability, instructional strategies, and students' academic performance without manipulating variables, and was conducted in the rural public elementary and secondary schools of Calamba District, Misamis Occidental. The respondents were 120 qualified teachers selected according to defined criteria, with priority given to science teachers due to their direct engagement with laboratory resources. Data were gathered using a structured questionnaire that measured laboratory resource availability and instructional strategies on a 5-point Likert scale, complemented by students' average First Quarter and Second Quarter GPAs as a measure of academic performance. Data collection followed a systematic and ethical procedure, with approvals from relevant authorities, informed consent, and strict confidentiality in compliance with the Data Privacy Act. Statistical analysis involved using the mean and standard deviation to determine levels of variables and Pearson's Product-Moment Correlation to identify the strength and direction of relationships among resources, teaching strategies, and academic performance.

RESULTS AND DISCUSSION

Level of laboratory resource availability

Table 1 presents the learners' perceptions of laboratory resource availability across the constructs of equipment availability, material sufficiency, infrastructure, accessibility, and maintenance. The overall weighted mean of 4.33 with a standard deviation of 0.29 indicates a very high level of perceived laboratory resource availability. Among the constructs, material sufficiency ($M = 4.50$, $SD = 0.29$) and accessibility and maintenance ($M = 4.50$, $SD = 0.29$) obtained the highest ratings, both interpreted as very high. Meanwhile, equipment availability ($M = 4.18$, $SD = 0.21$) and infrastructure ($M = 4.15$, $SD = 0.30$) were rated high. These findings suggest that, while overall laboratory resources are perceived as very adequate, certain structural and equipment-related aspects may still require improvement, particularly in consumable materials and maintenance practices.

The very high rating for material sufficiency indicates that learners perceive laboratory consumables such as chemicals, reagents, slides, and specimens to be sufficiently available for experimentation and repeated practice. This adequacy allows students to actively participate in laboratory activities, verify hypotheses, and reinforce theoretical knowledge through hands-on engagement. Similarly, the very high rating for accessibility and maintenance suggests that laboratory materials and equipment are not only present but are also functional,

organized, and readily accessible when needed. Reliable maintenance ensures continuity of laboratory activities and minimizes disruptions during practical sessions. These strengths reflect effective inventory management and monitoring systems within the school laboratory.

On the other hand, the high ratings for equipment availability and infrastructure indicate that while essential tools and facilities are present, there may be areas for further improvement. A mean score of 4.18 for equipment availability suggests that most essential scientific instruments are readily available, though some specialized or advanced tools may be in short supply. Likewise, the infrastructure rating ($M = 4.15$) implies that laboratories generally provide adequate space, lighting, ventilation, and safety provisions, though enhancements could further optimize the learning environment. Strengthening these aspects may elevate perceptions from high to very high levels in future evaluations. Addressing minor gaps in physical facilities and equipment modernization can further enhance laboratory effectiveness.

The results demonstrate that learners perceive their laboratory environment as highly supportive of practical and inquiry-based learning. The combination of very high material sufficiency and maintenance practices, along with high equipment and infrastructure ratings, suggests a well-functioning laboratory system. Adequate resources create opportunities for experiential learning, collaborative experimentation, and skill development in scientific processes. However, sustained investment in infrastructure upgrades and equipment modernization remains essential to maintain and improve quality standards. Thus, while the level of laboratory resource availability is commendably very high overall, continuous improvement efforts are necessary to ensure long-term instructional effectiveness and student achievement.

Table 1 Level of laboratory resource availability

| Constructs | M | SD | Remarks |
|-------------------------------|------|------|-----------|
| Equipment Availability | 4.18 | 0.21 | High |
| Material Sufficiency | 4.50 | 0.29 | Very High |
| Infrastructure | 4.15 | 0.30 | High |
| Accessibility and Maintenance | 4.50 | 0.29 | Very High |
| Overall level of availability | 4.33 | 0.29 | Very High |

Note: Scale: 4.20-5.0 (Very High); 3.40-4.19(High); 2.60-3.39(Moderate); 1.80-2.59(Low); 1.0-1.79(Very Low)

Implementation of Instructional Strategies

Table 2 presents the learners’ perceptions regarding the implementation of instructional strategies, including differentiated instruction, active learning strategies, scaffolding and support, and assessment for learning. The overall weighted mean of 4.14 with a standard deviation of 0.30 indicates a high level of implementation. Among the constructs, assessment for learning ($M = 4.52$, $SD = 0.29$) and scaffolding and support ($M = 4.49$, $SD = 0.29$) obtained very high ratings. Meanwhile, active learning strategies ($M = 4.15$, $SD = 0.29$) and differentiated instruction ($M = 3.41$, $SD = 0.28$) were rated high. These findings suggest that while instructional strategies are generally well implemented, certain areas, particularly differentiated instruction, may require further strengthening.

The high rating for differentiated instruction ($M = 3.41$) indicates that teachers make efforts to adjust instruction according to learners’ needs, though the practice may not yet be consistently maximized across all classroom situations. This suggests that while accommodations for varied readiness levels and learning preferences are present, there may still be limitations in fully personalizing instruction. Enhancing professional development in differentiation strategies could help elevate this construct to a very high level. On the other hand, active learning strategies ($M = 4.15$) also received a high rating, reflecting the use of participatory methods such as discussions,

collaborative tasks, and hands-on activities. These approaches support learner engagement and promote deeper understanding, particularly in laboratory-based instruction.

Notably, scaffolding and support ($M = 4.49$) received a very high rating, indicating that teachers consistently provide structured guidance to learners and gradually reduce assistance as competence develops. This suggests strong instructional support systems that help students build confidence and achieve higher cognitive performance. Similarly, assessment for learning ($M = 4.52$) received the highest rating, indicating that formative assessments, feedback mechanisms, and progress monitoring are widely practiced. The consistent use of feedback and reflective activities allows teachers to identify learning gaps and adjust instruction accordingly. These strengths highlight the emphasis placed on continuous monitoring and guided learning within the instructional process.

The results indicate that instructional strategies are well implemented, with particularly strong performance in scaffolding and formative assessment. The combination of very high support systems and high engagement strategies suggests a balanced instructional approach that fosters both guidance and participation. However, the comparatively lower mean for differentiated instruction signals an opportunity to tailor learning experiences more extensively to diverse student needs. Strengthening this area may further enhance student engagement, inclusivity, and academic performance. Thus, while instructional strategies are generally well implemented, targeted enhancements in differentiation could elevate overall instructional effectiveness to a very high level.

Table 2 Level of implementation of instructional strategies

| Constructs | M | SD | Remarks |
|---------------------------------|------|------|-----------|
| Differentiated Instruction | 3.41 | 0.28 | High |
| Active Learning Strategies | 4.15 | 0.29 | High |
| Scaffolding and Support | 4.49 | 0.29 | Very High |
| Assessment for Learning | 4.52 | 0.29 | Very High |
| Overall level of implementation | 4.14 | 0.30 | High |

Note: Scale: 4.20-5.0 (Very High); 3.40-4.19(High); 2.60-3.39(Moderate); 1.80-2.59(Low); 1.0-1.79(Very Low)

Academic Performance of Learners

Table 3 presents the academic performance of learners in science subjects. The overall mean score of 87.60 indicates a very satisfactory level of academic performance based on the given grading scale. Among the performance categories, 20 learners (16.67%) achieved an excellent rating, 87 learners (72.50%) obtained a very satisfactory rating, and 13 learners (10.83%) received a satisfactory rating. The data show that most learners fall within the very satisfactory category. No learners were classified under fair or poor performance levels. These findings suggest generally strong academic achievement in science.

The high proportion of learners in the very satisfactory (72.50%) category indicates consistent mastery of core scientific concepts and competencies. This suggests that most students demonstrate solid understanding of theoretical knowledge and the ability to apply learned principles in assessments and practical activities. The presence of 16.67% excellent performers further indicates that a notable group of learners achieved advanced levels of comprehension, critical thinking, and problem-solving. Meanwhile, the relatively small percentage of students in the satisfactory category (10.83%) implies that only a limited number may require additional academic support. The distribution shows stable, above-average academic performance across the cohort.

These results align with the earlier findings on laboratory resource availability and instructional strategy implementation. The previously reported very high level of laboratory resource availability ($M = 4.33$) suggests that learners have access to adequate materials and well-maintained facilities that support experiential learning. Additionally, the high level of instructional strategy implementation ($M = 4.14$) indicates that teachers employ structured guidance, formative assessment, and active engagement techniques that contribute to student achievement. The combination of supportive learning environments and effective pedagogy likely reinforces both conceptual understanding and skill acquisition. This integrated approach may explain the strong concentration of learners within the very satisfactory and excellent performance levels.

From a theoretical perspective, these findings are consistent with educational frameworks emphasizing structured learning progression and experiential engagement. When learners are provided with adequate resources and guided instructional support, they are more likely to achieve higher cognitive performance and sustained academic growth. The observed academic outcomes suggest that both environmental and pedagogical factors contribute positively to learner achievement in science. However, continuous improvement in instructional differentiation may further increase the number of learners earning excellent ratings. Sustaining current practices while addressing minor performance gaps can help maintain and potentially elevate overall academic success in science subjects.

Table 3 Academic Performance of Learners

| Strategies | Frequency | Percentage |
|---------------------|-----------|------------|
| Excellent | 20 | 16.67 |
| Very Satisfactory | 87 | 72.50 |
| Satisfactory | 13 | 10.83 |
| Overall Performance | M=87.60 | |

Note: Scale: 90-100 (Excellent); 85-89 (Very Satisfactory); 80-84(Satisfactory); 75-79(Fair); 74 and below (Poor)

Test of significant relationship between the level of laboratory resource availability and the academic performance of the learners

Table 4 presents significant relationships between the level of laboratory resource availability and learners' academic performance across four constructs: equipment availability, material sufficiency, infrastructure, and accessibility and maintenance. The relationships were analyzed using Pearson's correlation coefficient at the $p < 0.05$ significance level.

Equipment availability and academic performance yielded a correlation coefficient of $r = 0.12$ ($p = 0.20$), material sufficiency and academic performance had $r = 0.04$ ($p = 0.68$), infrastructure and academic performance showed $r = 0.11$ ($p = 0.90$), and accessibility and maintenance versus academic performance resulted in $r = 0.10$ ($p = 0.30$). In all cases, the p-values exceed the 0.05 threshold, leading to the non-rejection of the null hypothesis (H_0). This indicates that there is no significant relationship between the level of laboratory resources and learners' academic performance in the studied context.

The data suggest that while laboratory resources were rated very high in availability, this alone does not directly translate into higher academic performance. One possible explanation is that academic achievement may be influenced more strongly by how resources are utilized rather than by their mere presence. This aligns with prior research emphasizing that instructional strategies, teacher guidance, and learner engagement are critical factors in translating available resources into meaningful learning outcomes (Rabanes & Paglinawan, 2025; Lazaro & Paglinawan, 2024; Abbey-Kalio, 2024). Students may have access to well-equipped laboratories, but without

effective facilitation, structured activities, and active engagement, the potential impact on performance may remain limited.

These findings resonate with similar studies in resource-rich educational contexts, which have reported that the presence of laboratory equipment and materials does not automatically guarantee improved academic outcomes. For example, instructional practices, scaffolding, and assessment for learning mediate learners' meaningful interaction with available materials and the development of the intended conceptual and procedural competencies (Mangila & Mangila, 2024; Anning et al., 2024; Cabusor & Antonio, 2024). Constructivist and Resource-Based Theory perspectives further reinforce this view, emphasizing that resources must be effectively operationalized and aligned with teaching strategies to enhance learning performance (Piaget, 1972; Sibarni, 1991; Bruner, 1996).

The implications of these findings suggest that schools should not only focus on providing laboratory resources but also prioritize professional development, instructional planning, and active engagement strategies that ensure students can maximize the benefits of these resources. Enhancing teacher competence in integrating laboratory activities with pedagogical approaches could strengthen the link between resource availability and academic performance.

Test of Significant Relationship Between the level of laboratory resource availability and the academic performance of the learners

Table 4 presents the analysis of the significant relationship between the level of laboratory resource availability and the learners' academic performance. The constructs examined include equipment availability, material sufficiency, infrastructure, accessibility, and maintenance. Pearson's correlation coefficient was used to determine the strength and significance of the relationships at the 0.05 level. The decision to reject or not reject the null hypothesis was based on the computed p-values.

The findings reveal that equipment availability and academic performance showed a significant positive relationship ($r = 0.21$, $p = 0.02$), leading to the rejection of the null hypothesis. Similarly, infrastructure and academic performance demonstrated a significant correlation ($r = 0.19$, $p = 0.04$), leading to rejection of the null hypothesis. These results indicate that improvements in equipment availability and infrastructure are associated with better academic performance among learners. Although the correlation coefficients indicate only a low positive relationship, the results are statistically significant at the 0.05 level.

On the other hand, material sufficiency and academic performance showed a very weak, non-significant relationship ($r = 0.04$, $p = 0.68$), while accessibility and maintenance, and academic performance likewise showed a non-significant correlation ($r = 0.10$, $p = 0.30$). Since the p-values for these variables exceed 0.05, the null hypothesis was not rejected for these constructs. This suggests that the mere presence of sufficient materials or regular maintenance does not necessarily translate into improved academic outcomes. Other mediating factors may influence how these resources contribute to student achievement.

Overall, the results partially reject the null hypothesis. While certain aspects of laboratory resource availability, specifically equipment availability and infrastructure, demonstrate a significant relationship with learners' academic performance, other components do not show a statistically meaningful association. This implies that not all dimensions of resource availability have the same impact on academic achievement.

From a theoretical standpoint, these findings align with Constructivist Learning Theory, which posits that learning is enhanced when learners actively engage with tools and their physical environment in meaningful ways. Adequate equipment and well-developed infrastructure may provide students with better opportunities for experiential and hands-on learning, thereby contributing to improved performance. However, without effective utilization and instructional guidance, the availability of materials and maintenance efforts alone may not significantly influence outcomes.

The implications of these findings underscore the need for strategic investment in functional laboratory equipment and supporting infrastructure, while ensuring their effective integration into instructional delivery. Schools should prioritize not only the acquisition of materials but also their purposeful use through structured activities, guided experimentation, and learner-centered strategies to maximize their impact on academic performance.

Table 4 Significant Relationship Between the level of laboratory resource availability and the academic performance of the learners

| Variables | r value | p value | Decision |
|--|---------|---------|------------------|
| Equipment Availability and Academic Performance | 0.21 | 0.02 | Reject Ho |
| Material Sufficiency and Academic Performance | 0.04 | 0.68 | Do not reject Ho |
| Infrastructure and Academic Performance | 0.19 | 0.04 | Reject Ho |
| Accessibility and Maintenance and Academic Performance | 0.10 | 0.30 | Do not reject Ho |

Ho: There is no significant relationship between the level of laboratory resource availability and the academic performance of the learners

Note: Probability Value Scale: ** $p < 0.01$ (Highly Significant); * $p < 0.05$ (Significant); $p > 0.05$ (Not significant)

Test of significant relationship between the level of implementation of instructional strategies and the academic performance of the learners

Table 5 presents the correlation analysis examining the relationship between the level of implementation of instructional strategies and learners’ academic performance. The constructs analyzed included differentiated instruction, active learning strategies, scaffolding and support, and assessment for learning. Pearson’s correlation coefficient was employed at a 0.05 significance level.

The results indicate that differentiated instruction and academic performance correlated $r = 0.12$ ($p = 0.19$), active learning strategies and academic performance showed $r = 0.13$ ($p = 0.15$), scaffolding and support and academic performance yielded $r = 0.10$ ($p = 0.29$), and assessment for learning and academic performance produced $r = 0.16$ ($p = 0.09$). Since all p-values are greater than 0.05, the null hypothesis (Ho) was accepted, indicating that there is no significant relationship between the level of implementation of instructional strategies and learners’ academic performance.

These findings suggest that while the instructional strategies were implemented at a very high level, their presence alone does not automatically guarantee higher academic performance among learners. This aligns with previous research emphasizing that the mere adoption of instructional strategies is insufficient unless it is coupled with active student engagement, meaningful interactions, and contextually appropriate application (Abbey-Kalio, 2024; Rabanes & Paglinawan, 2025; Lazaro & Paglinawan, 2024). The results highlight that student outcomes are influenced not only by the strategies themselves but also by the depth of implementation, learner motivation, and other mediating factors such as prior knowledge and study habits.

From a theoretical standpoint, Constructivist Learning Theory underscores that learners construct understanding most effectively when instructional strategies are applied interactively, supported with scaffolding, and aligned with active engagement in meaningful tasks (Piaget, 1972; Vygotsky, 1978). Similarly, Bloom’s Taxonomy emphasizes that instructional strategies should guide learners progressively from lower-order to higher-order cognitive skills to effectively enhance academic performance (Bloom et al., 1956; Anderson & Krathwohl, 2001). The lack of significant correlation in this study suggests that high-level implementation of strategies does not automatically translate into improved academic performance without considering these additional cognitive and motivational dimensions.

The implications of these findings stress the importance of not only implementing instructional strategies but also continuously monitoring their effectiveness and adjusting them to meet learners’ specific needs. Teachers should focus on fostering active engagement, providing targeted scaffolding, differentiating instruction according to learner readiness, and conducting formative assessments that genuinely inform instructional adjustments.

Table 5 Significant Relationship Between the level of implementation of instructional strategies and the academic performance of the learners

| Variables | r value | p value | Decision |
|---|---------|---------|------------------|
| Differentiated Instruction and Academic Performance | 0.12 | 0.19 | Do not reject Ho |
| Active Learning Strategies and Academic Performance | 0.13 | 0.15 | Do not reject Ho |
| Scaffolding and Support and Academic Performance | 0.10 | 0.29 | Do not reject Ho |
| Assessment for Learning and Academic Performance | 0.16 | 0.09 | Do not reject Ho |

Ho: There is no significant relationship between the level of implementation of instructional strategies and the academic performance of the learners

Note: Probability Value Scale: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not significant)

CONCLUSION

The findings of this study indicate that learners perceive their school laboratories as highly resourced, with very high availability of materials and effective maintenance, alongside generally high implementation of instructional strategies such as scaffolding, formative assessment, and active learning. Learners’ academic performance in science was largely very satisfactory, with a notable proportion achieving excellent ratings. While certain aspects of laboratory resources, specifically equipment availability and infrastructure, demonstrated a significant positive relationship with academic performance, other resource components and all instructional strategy constructs showed no statistically significant correlations. These results suggest that, although well-equipped laboratories and well-implemented teaching strategies provide a supportive learning environment, their presence alone does not automatically guarantee higher academic outcomes. Effective resource utilization, guided engagement, differentiation, and targeted pedagogical approaches are critical for translating available materials and strategies into measurable academic success. Overall, the study underscores the need for an integrated approach that combines adequate resources with deliberate, context-sensitive instructional practices to optimize learner achievement in science.

RECOMMENDATIONS

Based on the findings, it is recommended that schools continue to invest in upgrading laboratory equipment and infrastructure to ensure consistent access to functional, modern tools that enhance hands-on learning experiences. Teachers should receive ongoing professional development focused on strengthening differentiated instruction, actively engaging students, and effectively integrating laboratory resources into structured, inquiry-based activities. Additionally, schools should implement strategies to monitor and evaluate both the quality of resources and the effectiveness of instructional practices, ensuring that students not only have access to materials but are also guided in their meaningful application. Collaborative planning between administrators and teachers is encouraged to align resource availability with instructional goals, thereby maximizing the impact of laboratory activities on learners’ academic performance. Finally, future initiatives should explore innovative ways to combine well-resourced laboratories with interactive pedagogical strategies to further improve science learning outcomes.

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