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Utilization of Learning Tools Equipment- Science and Mathematics Equipment (LTE-SME) and Academic Performance of Secondary School Learners

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Abstract

The purpose of this descriptive study was to find out the level of instructional utilization of learning tools and equipment or Science and Mathematics equipment (LTE-SME) and the academic performance of learners among secondary school teachers in one large rural-based district, Division of Negros Oriental during School Year 2025–2026. Data were collected from sixty teacher-respondents using a validated questionnaire with good inter-rater reliability ratings on teachers' instructional practices in terms of three key result areas namely instrumentation, curriculum integration, and assessment of learning. Results indicated that teachers have a very high level of utilization of LTE-SME implying that they have excellent integration of instructional tools and equipment. Tests of significance showed that educational attainment, teaching years, and number trainings attended affected the respondents' instructional practices on curriculum integration and assessment of learning on LTE-SME, with teachers who attended more trainings showing better instructional practices. Furthermore, non-significant difference was observed when the respondents grouped according to their area of specialization. Learners achieved a very satisfactory level of academic performance but revealed no significant relation between LTE-SME utilization and academic performance of learners.

Keywords: *Academic performance, learning tools equipment (lte-sme), secondary school learners*

Bio-Profile:

Meljoy K. Kinilitan is a licensed public secondary school teacher under the Schools Division of Negros Oriental. She holds a Master's Degree in Administration and Supervision. Her research interests include leadership, education, human resource development, and related fields, areas where she aims to contribute through both practical experience and academic exploration.

Introduction

Rationale

In today's modern education, the utilization of Learning Tools and Equipment (LTE) in Science and Mathematics plays a vital role in helping learners connect theoretical knowledge with practical application. These tools also develop learners' critical thinking and problem-solving skills (Shana & Abulibdeh, 2020). In response to improving education quality, the Department of Education (DepEd) has implemented reforms such as the MATATAG curriculum, which strengthens foundational competencies and prepares learners for future learning demands (Ignacio et al., 2022).

Teacher-related factors such as educational attainment, training, and teaching experience influence how instructional resources are integrated into teaching (Ali et al., 2023). These factors are essential in determining the level of LTE utilization in Science and Mathematics classrooms.

At the school level, there are existing initiatives to support LTE utilization. School heads encourage teachers during meetings to maximize the use of available instructional tools and equipment. Learning Action Cell (LAC)

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sessions are also conducted among Science and Mathematics teachers to strengthen collaboration and improve instructional practices. In addition, the Department of Education provides schools with learning materials and equipment. Despite these efforts, the extent to which these supports are translated into consistent classroom practice remains unclear.

Despite these interventions, research gaps still exist. Limited studies have focused on how specific teacher characteristics, particularly area of specialization, influence LTE utilization in rural secondary schools. Furthermore, there is a lack of studies examining LTE implementation in rural district settings, where access to resources and instructional conditions may differ significantly from urban schools. This highlights the need to explore LTE utilization within these contexts.

Moreover, studies indicate that attending training programs does not always result in effective classroom application of LTE, suggesting a gap between professional development and actual teaching practice (Schaffner et al., 2020). This concern aligns with Sustainable Development Goal 4 (SDG 4), which promotes inclusive and equitable quality education and lifelong learning opportunities for all. Addressing this gap is essential in improving teaching effectiveness and learner outcomes.

Given these gaps, this study aims to examine the utilization of Learning Tools and Equipment in Science and Mathematics (LTE-SME) and its relationship with the academic performance of secondary school learners in selected rural secondary schools. The findings are expected to contribute to improving instructional practices and addressing gaps in LTE utilization in line with SDG 4.

Literature Review

Instrumentation in teaching refers to how educators use physical, digital, and experimental resources—such as laboratory equipment, simulations, and manipulatives—to support active and meaningful learning. Grounded in Constructivist, Experiential, and Cognitive Learning Theories, these tools promote hands-on engagement and higher-order thinking. Studies show that interactive technologies such as LabVIEW and Arduino enhance understanding of complex concepts by linking theory with practice and enabling experiential learning (Ramadhan et al., 2023). Similarly, effective integration of laboratory tools depends not only on availability but also on pedagogical strategies such as scaffolding and inquiry-based learning, which help develop students' problem-solving skills and technical competence (Warner et al., 2016). However, the presence of tools alone is insufficient, as teacher-related factors—such as training, specialization, and experience—play a crucial role in maximizing their use and impact.

Laboratory equipment, such as microscopes, calculators, and measuring devices, helps make abstract concepts more concrete by engaging students in hands-on and practical learning experiences. This supports Personalized, Experiential, and Cognitive Learning Theories, which emphasize learning through active involvement, exploration, and application of knowledge. The effective use of these tools depends largely on teachers' skills, training, and access to resources, underscoring the importance of examining how teacher characteristics influence their utilization in real classroom settings. Moreover, the use of varied instructional materials—especially in resource-limited environments—enhances student participation and motivation, as supported by Constructivist Learning Theory. Strategies such as Problem-Based Learning, hands-on projects, and the integration of digital tools and simulations further strengthen engagement, critical thinking, and retention, ultimately improving the quality of science education (Rabanes & Paglinawan, 2025; Landicho, 2025).

A cross-national study by Kohanová et al. (2025) shows that teachers' use of instructional resources varies widely by context, beliefs, and access, suggesting that the integration of learning tools is inconsistent across classrooms. Research on technology-enhanced mathematics learning further indicates that digital tools—such as simulations and interactive platforms—can improve student engagement and conceptual understanding when used effectively. This underscores that while instructional materials are valuable, their impact depends on how they are utilized. In addition, authentic, technology-supported activities, such as problem-based or forensic-style laboratory

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tasks, help students connect theoretical knowledge with real-world applications and develop practical skills in using scientific instrumentation (Lunsford, 2022). Similarly, integrated instruction has been shown to strengthen students' confidence, interdisciplinary understanding, and problem-solving abilities, emphasizing the importance of combining conceptual and applied learning approaches (Aguirre-Munoz et al., 2022).

Recent studies emphasize the growing role of both physical and digital tools in improving Science and Mathematics instruction, though their use remains moderate and context-dependent. Arellano and Lumogdang (2025) noted that while teachers frequently use digital resources, greater training and support are still needed. Meanwhile, Rebulanan and Samala (2021) found that limited laboratory equipment does not necessarily hinder learning, as effective teaching strategies and teacher competence can compensate for resource gaps. However, challenges such as insufficient equipment, overcrowded classrooms, and a lack of teacher training continue to restrict optimal use of instructional tools (Cabusor & Antonio, 2025). These findings highlight that while resources are important, their impact depends largely on teacher capability, instructional practices, and systemic support.

Academic performance, as measured by outcomes such as grades and competencies, is influenced by instructional strategies, teacher effectiveness, and access to learning resources. Research indicates that combining virtual and physical manipulatives yields better learning outcomes than using traditional tools alone, underscoring the value of diverse instructional materials. Approaches such as Problem-Based Learning and technology-supported instruction foster higher-order thinking and real-world application of knowledge, contributing to improved student achievement. Furthermore, integrating technology into both teaching and assessment supports authentic, multidimensional evaluation of learners' skills and understanding. These strategies, aligned with authentic and experiential learning principles, ultimately enhance student engagement and academic performance (Akanbi et al., 2022; Siller & Ahmad, 2024).

In terms of academic performance, research shows that multiple factors beyond the use of instructional tools influence learning outcomes. Labasano (2015) identified study habits, attendance, and active participation as key predictors of student achievement, suggesting that personal discipline plays a major role. Similarly, Beros et al. (2024) argued that low mathematical performance among Filipino students is more closely linked to weak foundational understanding than to the use of tools like calculators. These insights suggest that while learning tools can support instruction, they do not automatically lead to improved academic outcomes. Instead, student performance is shaped by a combination of instructional quality, learner behavior, and contextual factors, reinforcing the need to examine how tool utilization interacts with these variables.

However, the relationship between the use of learning tools and students' academic performance remains complex. Large-scale findings from Courtney et al. (2022) reveal that while digital resources can support learning, their effects are not always consistent, as outcomes depend on factors such as teaching quality, alignment with instructional goals, and student readiness. This suggests that technology alone does not guarantee improved achievement. Complementing this, exposure to authentic laboratory experiences allows students to engage in real-world experimentation, enhancing both their technical skills and conceptual understanding. Such experiences also provide meaningful ways to assess student competencies, as learners demonstrate problem-solving abilities and apply scientific principles in practical contexts (Kennepohl, 2025). Overall, these findings highlight the need to examine how the level of utilization of learning tools relates to academic performance in Science and Mathematics education.

However, the successful integration of instructional tools is not guaranteed and depends on thoughtful lesson planning, teacher preparedness, and contextual factors. While these tools can improve conceptual understanding, their impact on academic performance also relies on teaching effectiveness and student readiness. Research highlights the need to examine the relationship between the utilization of learning tools and student achievement in Science and Mathematics. Approaches such as Project-Based Learning (PBL) have been shown to enhance critical thinking, collaboration, and problem-solving skills through authentic, real-world tasks and technology-supported activities. Grounded in Constructivist and Cognitive Learning Theories, these strategies

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promote active knowledge construction and deeper understanding, leading to more comprehensive assessment and improved learning outcomes when effectively implemented (Dacumos & Silva, 2023).

Theoretical Underpinnings

This study is linked on the idea that the effective utlization of Learning Tools and Equipment in Science and Mathematics packages contribue to better academic performance among secondary school learners. The framework was anchored on John Dewey's "Learning by doing," also known as experiential learning. It holds that students learn best through active engagement and manipulation rather than passive listening to a lecture and mere memorization of facts. Forms of knowledge are inseparable from real-world experience and self-exploration. Additionally, experiential learning helps learners develop problem-solving, critical thinking, working memory, and self-regulation skills. In addition, this study is also anchored on Carl Weiman's “Active Learning” theory, which emphasizes that students learn better through physical engagement and collaboration, especially in the Science area.

In this study, the independent variable is the “Level of utilization of LTE-SME which is examined in terms of the three key result areas namely: (a) instrumentation, (b) integration in the curriculum and (c) assessment of learning. The dependent variable is the “Level of the academic performance of secondary school learners”. The teacher profiles included in the scope of this study are: highest educational attainment, length of service, number of relevant trainings attended and area of specialization where it was also determined if the level of LTE-SME utilization will have significant differences once the respondents are grouped according to these characteristics.

Curriculum integration refers to how instructional learning tools and equipment are merged into classroom lessons to support instructional activities and objectives. This concept also aligns with Constructivist Learning Theory, suggesting how students learn and understand concepts better when classrooms allow learners to explore, collaborate, and participate in learning activities. Shana and Abulibdeh (2020) stated that teachers who are trained on laboratory tools could effectively support students' learning and yield increased participation and understanding of concepts. Curriculum integration of LTE-SME provides teachers the opportunity to create lessons that support critical thinking, problem-solving, and higher-order learning skills.

Assessment of learning is the extent to which LTE-SME helps teachers gauge students' knowledge through hands-on activities, laboratory experimentation and performance-based assessments. This dimension is underpinned by the Experiential Learning Theory which suggests that when learners are given opportunities to reflect on their direct experiences and apply learnt concepts to real-world scenarios, the learning becomes more significant. According to Sias et al. (2016), when laboratory activities are student-centered, students develop into active participants of their learning. The learners were responsible for doing the experiments but also had to design the procedures, record observations and conclude what they learned from the activity. Providing students with opportunities for hands-on scientific inquiry allowed them to learn concepts by seeing its real-world application. This allowed them to better understand concepts and develop better scientific inquiry skills. Therefore, when assessments are carried out appropriately, learners have the opportunity to apply what they have learned through hands-on activities and demonstrate mastery of identified competencies.

Factors related to teachers can also affect the extent of LTE-SME implementation. Educators with advanced degrees, more years of teaching experience, professional development related trainings, and those who teach Science or Mathematics have been found to make full use of pedagogical tools to facilitate the teaching-learning process. Cabusor and Antonio (2025) stated that "when teachers feel prepared and are provided opportunities for professional development, they confidently and effectively embed learning tools within instruction leading to improved learner outcomes."

In order to determine the level of instructional LTE-SME utilization, the reseacher made used a validated self-made questionnaire outlined on the identified variables in this study. The data gathering tool employed a five-point likert scale where 5 represented as “Very High Level of Utilization” and 1 represented as the lowest. The

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responses were analyzed with use of appropriate statistical tools to determine the level of instructional utilization and to determine whether significant differences existed when the sixty-teacher respondents are grouped according to the study's major characteristics. The statistical tools that were utilized in this study are aligned with the research problems to ensure that accuracy and consistency in data interpretation.

Objectives

This study aimed to determine the Level of Utilization of LTE-SME and the Academic Performance of Secondary School Learners in a large rural school district during the SY 2025 – 2026. Specifically, this study sought to find answers to the following questions: 1) the level of utilization of learning tools and equipment in Science and Mathematics (LTE-SME) by teachers as assessed by themselves according to the following Key Result Areas such as instrumentation, integration in the curriculum, assessment of learning; 2) the level of learners' academic performance in the first and second quarters during School Year 2025-2026; 3) the significant difference in the level of utilization of learning tools and equipment in Science and Mathematics (LTE-SME) when respondents are grouped and compared according to related trainings attended, highest educational attainment, teaching experience, and area of specialization; and 4) the significant relationship between the level of utilization of learning tools and equipment in Science and Mathematics (LTE-SME) and the level of academic performance of secondary school learners.

Methodology

This section discusses the methods used to gather and analyze data in line with the predetermined objectives. This outline includes research design, subject-respondents, research instruments, data collection procedures, ethical considerations, data analysis, and statistical methods.

Research Design

This study aimed to determine the level of utilization of Learning Tools and Equipment–Science and Mathematics Equipment (LTE-SME) and the academic performance of secondary school learners. A descriptive research design was employed to achieve this. According to McCombes (2023), a descriptive research design aims to systematically and accurately describe a population, situation, or phenomenon. It is commonly used to answer what, where, when, and how questions, but not why. Furthermore, this design identifies characteristics, trends, categories, and frequencies. The descriptive design was deemed appropriate for this study because it allows the researcher to systematically assess and describe the level of LTE-SME utilization and learners' academic performance without manipulating any variables. It is suitable for gathering factual data from teachers as they naturally occur in the school setting. In addition, it helps establish a clear profile of instructional practices and student performance, which serves as a basis for further analysis of their relationship.

Respondents

The researcher selected five (5) secondary schools that are LTE-SME recipients, herein referred to as School A, School B, School C, School D, and School E. These schools are located in a rural public secondary school district within the Division of Negros Oriental. In total, there are sixty (60) nationally paid teachers handling Science or Mathematics-related subjects in the said schools.

Instrument

The study utilized simple percentages to describe the demographic profile of the sixty (60) teacher-respondents in terms of training attended, highest educational attainment, teaching experience, and area of specialization, providing a clear and organized presentation of their characteristics. The research instrument

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consisted of three parts, including a 30-item questionnaire measuring teachers' level of utilization of Learning Tools in Science and Mathematics in terms of instrumentation, curriculum integration, and assessment of learning, rated using a 5-point Likert scale, and a section identifying students' academic performance based on their average grades with corresponding verbal interpretations. To ensure validity, three experts with master's and doctoral degrees in Science and Mathematics evaluated the instrument using established criteria, resulting in an excellent validation average of 5.00, confirming its appropriateness. Reliability was tested in a separate group of 30 Science and Mathematics teachers, yielding a Cronbach's Alpha of 0.738, indicating acceptable internal consistency and confirming that the questionnaire reliably measures the intended constructs.

Procedure for Data Collection

Once the data-gathering instrument was approved, the researcher wrote a formal letter requesting permission from the school principals to conduct the study. After obtaining official permission, the researcher administers reliability testing to determine the research tool's reliability. Once the tool's reliability was established, the researcher sought the permission of the Science and Mathematics teachers to participate in the study. The data gathered from the teachers were tallied and tabulated using appropriate statistical tools. The raw data were transformed into numerical code by a coding manual. This allowed statistical derivations, computer processing, and tabular presentation. The Statistical Package for the Social Sciences (SPSS) was used to process the data. Based on the study's findings, the researcher will formulate conclusions and recommendations.

Data Analysis and Statistical Treatment

Objective 1 used descriptive statistical analysis of the weighted mean to determine the level of utilization of learning tools and equipment in Science and Mathematics (LTE-SME) in terms of instrumentation, integration into the curriculum, and assessment of learning. Objective 2 also used descriptive statistical analysis, including a weighted mean, to determine the level of learners' academic performance in the first and second quarters of School Year 2025–2026. Objective 3 likewise used descriptive statistical analysis, including a weighted mean, to determine the level of LTE-SME utilization when grouped by teachers' profile variables. Objective 4 used the Mann–Whitney U test (and/or an equivalent nonparametric test, depending on the grouping) to determine whether there is a significant difference in LTE-SME utilization levels across groups defined by training attended, highest educational attainment, length of service, and specialization. Objective 6 used the Spearman Rank Correlation Coefficient to determine the significance and direction of association between LTE-SME utilization and the academic performance of secondary school learners.

Ethical Considerations

This study adhered to the ethical standards set by STI West Negros University and the School of Graduate Studies. All teacher-respondents were informed of the study's purpose, scope, and procedures. Participation was strictly voluntary, and informed consent was obtained before administering the research instruments. Respondents were assured of their right to withdraw at any stage of the study without penalty. Confidentiality and anonymity were maintained throughout the research process. Data collected were stored securely and accessible only to the researcher, ensuring that responses remained private and protected. The study was conducted with respect for participants' dignity and welfare. No physical, psychological, or professional harm was anticipated or incurred. The research was limited to normal teaching and learning contexts, and findings were reported honestly and objectively.

Results and Discussions

This section summarizes the study's findings, which come from careful data gathering, in-depth analysis, and thoughtful interpretation. After this, meaningful conclusions were drawn from the initial phase, offering valuable insights.

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Level of Teachers' Utilization of LTE-SME in the Area of Instrumentation, Integration in Curriculum, and Assessment of Learning

Table 1
Level of Teachers' Utilization of LTE-SME in Instrumentation

Indicators	Mean	Interpretation
As a teacher, I…		
Use a variety of learning tools and equipment to enhance my teaching in Science/Mathematics.	4.50	Very High Level
Feel confident in using learning equipment during my Science/Math lessons.	4.17	Very High Level
Have access to various learning equipment in our school.	4.17	Very High Level
Receive training to develop my teaching methodologies in Science/Math.	4.33	Very High Level
Use learning tools and equipment that effectively aid students' understanding of scientific/mathematical concepts.	4.50	Very High Level
Incorporate test tubes for conducting experiments in chemistry/geometric sets into lessons to teach shapes and measurement.	4.17	Very High Level
Provide students with access to computer software for simulations and modeling/calculators during math lessons for problem-solving.	4.50	Very High Level
Believe that hands-on experience and manipulation are the best ways to learn Science/Math lessons.	4.00	Very High Level
Encourage my students to test the theories/principles they learn with the use of learning tools and equipment in the laboratory/classroom.	4.33	Very High Level
Utilize outdoor space for environmental/arithmetic/experimental activities with the use of learning tools and equipment.	4.17	Very High Level
Overall Mean	**4.28**	**Very High Level**

Table 1 presents the level of teachers' Utilization of LTE-SME in terms of instrumentation. Among the indicators, several items obtained the lowest weighted mean of 4.00, "*Believe that hands-on experience and manipulation are the best ways to learn Science/Math lessons.*" and 4.17, namely: *"Feel confident in using learning equipment during Science/Mathematics lessons," "Have access to various learning equipment in the school," "Incorporate test tubes for conducting experiments in chemistry/geometric sets into lessons,"* and *"Utilize outdoor space for environmental/arithmetic/experimental activities with the use of learning tools and equipment."* Although these indicators are still interpreted as a High Level of Utilization, they are comparatively lower than the other items in the set.

The results suggest that while teachers generally use learning tools and equipment effectively, there are still areas that may require strengthening, particularly in confidence in using equipment, resource availability, and the consistent integration of hands-on and outdoor-based instructional activities.

This implies that schools may need to further enhance support mechanisms, such as continuous professional development, improved access to laboratory and instructional materials, and structured training to maximize the use of available LTE-SME resources, thereby further strengthening instructional practice in Science and Mathematics.

The results contradict the study by Rebulanan & Samala (2021), which found an evident scarcity of laboratory equipment in some Science High Schools in the Philippines, with teachers usually rating it "rarely" used. Despite the healthy dependence and utilization of learning tools of teacher-respondents in their teaching, some may not feel confident in utilizing these tools in their lessons, with the lowest weighted mean average of 4.17, similarly linked to the study conducted by Cabusor & Antonio (2025), which highlighted that the availability of materials does not guarantee effective use.

Table 2

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Level of Teachers' Utilization of LTE-SME in Integration into the Curriculum

Indicators	Mean	Interpretation
As a teacher, I…		
Find learning tools and equipment essential in my lesson planning in Science/Mathematics.	4.67	Very High Level
Include hands-on experiments/problem-solving in the Science/Math curriculum.	4.50	Very High Level
Join Learning Action Cell (LAC) sessions to collaborate with my colleagues and share best practices on how to use the learning tools in my curriculum.	4.67	Very High Level
Incorporate Science/Mathematics learning tools and equipment in the MELCs Guidelines that I read.	4.33	Very High Level
Provide mathematical/experimental activities/ congruent to the objectives of the lesson.	4.50	Very High Level
Design activities that incorporate real-world applications of Science/Mathematics.	4.50	Very High Level
Create assignments that require the application of both Science and Mathematics.	4.00	Very High Level
Utilize project-based learning that integrates scientific/mathematical ideas.	3.67	Very High Level
Develop lesson plans that require students to use various learning equipment.	4.67	Very High Level
Provide opportunities for students to work collaboratively using laboratory and measurement tools.	4.50	Very High Level
Overall Mean	**4.40**	**Very High Level**

Table 2 presents the level of teachers' Utilization of LTE-SME in terms of integration into the curriculum. Among the indicators, the lowest weighted mean was obtained by the item *"Utilize project-based learning that integrates scientific/mathematical ideas,"* with a weighted mean of 3.67, interpreted as a High Level of Utilization but lower than the other indicators.

The result suggests that although teachers are generally integrating learning tools and equipment into their instructional practices, the use of project-based learning as a strategy for integrating Science and Mathematics concepts is less frequently used than other approaches.

This implies that teachers may need further support and capacity-building activities to strengthen their use of project-based learning strategies. Additional training, mentoring, and the sharing of best practices through Learning Action Cell (LAC) sessions may help enhance the consistent integration of LTE-SME by adopting more learner-centered, application-based instructional approaches.

The results align with the study conducted by Aguirre-Munoz et al. (2022), in which colleagues work hand in hand and form a learning circle (one Math teacher, one Science teacher, and one faculty member) to develop integrated lesson plans for their teaching. The sixty (60) teacher-respondents display eagerness in joining Learning Action Cell (LAC) sessions and exchanging ideas about the inclusion of lab tools and Math equipment to be used. The result showed that it improved student feedback and engagement in the lesson.

Table 3

Level of Teachers' Utilization of LTE-SME in Assessment of Learning

Indicators	Mean	Interpretation
As a teacher, I…		
Observe higher scores compared to when there are no learning tools in Science and Mathematics used.	4.17	Very High Level

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Include varied assessments to include projects using learning tools.	4.33	Very High Level
Provide opportunities for students to demonstrate their knowledge using learning tools during their assessment.	4.17	Very High Level
Notice improved performance with equipment-based assessments.	4.67	Very High Level
Promote deeper understanding through tool-based assessments.	4.83	Very High Level
Evaluate student portfolios showcasing their Science and Mathematics work.	3.83	High Level
Assess students' understanding through practical experiments and problem-solving scenarios using tools and equipment.	4.17	Very High Level
Incorporate performance tasks that require the use of measurement tools.	4.33	Very High Level
Offer student presentations showcasing their work with scientific/mathematical equipment.	4.67	Very High Level
Employ formative assessments that involve using learning equipment.	5.00	Very High Level
Overall Mean	**4.42**	**Very High Level**

The lowest rated means are the following: using learning tools (4.17), giving students opportunities to demonstrate what they know using the tools (4.17) and assessing knowledge by solving real problems with experiments (4.17), including performance tasks that require the use of measurement or experimental scale / measuring tool (4.33) and providing diverse types of project-based assessments (4.33 has a verbal description of very high level). Portfolio assessment (3.83) was also categorized as a High Level utilization.

Overall, teachers often incorporate LTE-SME in their assessment practices, especially through formative, performance-based, and tool-assisted strategies. This shows a tight integration between using instructional materials not just in instruction but also in assessing what students know, can do, and understand at a much deeper level. This aligns with the study by Dacumos & Silva (2023), which used project-based learning (PBL) to foster students' critical thinking.

Level of Learners' Academic Performance during the First and Second Period of the School Year 2025-2026

Table 4
Level of Learners Academic Performance

Learners	Mean	Interpretation
Academic Performance	87.09	Very Satisfactory

Table 4 presents the level of learners' academic performance during the first and second grading periods of the School Year 2025–2026. The learners obtained an overall mean score of 87.09, which is interpreted as Very Satisfactory.

This indicates that, on average, students consistently perform well academically. The result suggests that learners achieved a level of proficiency that reflects a solid understanding of the subject matter covered, demonstrating that the instructional strategies and learning tools employed by the teachers, including LTE-SME, may have contributed to students' academic success. This supports the study by Ramadhan et al. (2023), in which the experimental group taught with blended learning and instrumentation achieved higher scores than the control group, which was taught using the traditional lecture method.

Comparative Analysis in the Level of Teachers' Utilization of LTE-SME in Instrumentation, Integration in the Curriculum, and Assessment of Learning when grouped and compared according to Educational Attainment, Length of Service, Number of Relevant Trainings, and Specialization

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Table 5
Difference in the Level of Teachers' Utilization of LTE-SME in Instrumentation According to Variables

Variable	Category	N	Mean Rank	Mann-Whitney U test	p-value	*Sig. level*	Interpretation
Highest Educational Attainment	Lower	22	38.98	231.50	0.004	0.05	Significant
	Higher	38	25.59				
Length of Service	Shorter	26	35.69	307.00	0.043		Significant
	Longer	34	26.53				
Number of Relevant Trainings	Few	29	22.47	216.50	0.001		Significant
	Many	31	38.02				
Specialization	Science	24	26.38	333.00	0.133		Not Significant
	Mathematics	36	33.25				

Table 5 shows the difference in teachers' Utilization of LTE-SME with respect to instrumentation when grouped by selected profile variables, using the Mann-Whitney U test at.05 level of significance.

The analysis showed a statistically significant difference in Utilization in the area of instrumentation between the groups based on the highest level of education (U = 231.50, p = 0.004). Based on the results, teachers with lower educational attainment obtained a much higher mean rank, computed to be 38.98, as compared to those with higher educational attainment, who only had a mean rank of 25.59, which already confirms that educational attainment is a vital factor in considering the level of utilization of LTE-SME in instructional instrumentation.

There was also a statistically significant difference in service length using the Mann–Whitney U test (U = 307.00, p = 0.043). In terms of LTE-SME use for instructional instrumentation, the mean rank was lower with a longer length of service (35.69) compared to teachers with shorter length of service (26.53), indicating that less experienced teachers reported higher usage of LTE-SME in instructional instrumentation than their experienced colleagues.

Similarly, the number of relevant training courses attended also indicated a significant difference (U = 216.50, p = 0.001). Teachers who attended many relevant training courses had a higher mean rank (38.02) than those who attended few trainings (22.47), suggesting that participation in relevant trainings influences teachers' use of LTE-SME in instrumentation.

In contrast, when the data were categorized by the teacher’s area of specialization, no statistically significant difference was observed (U = 333.00, p = 0.133). This indicates that specialization may not influence the level of the teachers' use of LTE-SME during instructional instrumentation, as Mathematics teachers had a slightly higher mean rank (33.25) than Science teachers (26.38).

In general, the results suggest that out of four (4) variables, namely highest educational attainment, length of service, number of relevant trainings attended, and specialization, the former three had a significant influence on teachers' level of Utilization, but specialization did not.

This contradicts the study conducted by Kurt & Akoglu (2023), where the major challenges met in implementing learning tools and project-based learning methods include time constraints, lack of teaching training, and resource limitations. The results of this study show a significant difference based on the number of teachers who attended relevant training.

Table 6
Difference in the Level of Teachers' Utilization of LTE-SME in Integration in the Curriculum According to Variables

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Variable	Category	N	Mean Rank	Mann-Whitney U test	p-value	*Sig. level*	Interpretation
Educational Attainment	Lower	22	38	253.00	0.011	0.05	Significant
	Higher	38	26.16				
Length of Service	Shorter	26	33.40	366.50	0.257		Not Significant
	Longer	34	28.28				
Number of Relevant Trainings	Few	29	22.62	221.00	0.001		Significant
	Many	31	37.87				
Specialization	Science	24	32.75	378.00	0.412		Not Significant
	Mathematics	36	29.00				

Table 6 shows the difference in the level of teachers' Utilization of LTE-SME as to integration in the curriculum when grouped according to selected profile variables using the Mann–Whitney U test at a 0.05 level of significance.

The findings indicate a statistically significant difference in usage of instructional method when teachers were grouped based on the highest education attained ($U = 253.00$, $p = 0.011$). The null hypothesis is rejected because the obtained p-value is smaller than the level of significance, which is 0.05. Teachers with lower levels of educational attainment had a higher mean rank (38.00) than teachers with higher levels of educational attainment (26.16). That means this is an essential factor contributing to the integration of LTE-SME in the curriculum based on education qualifications.

On the other hand, when assessing by length of service and conducting a Mann–Whitney U test, the result yielded a p-value of 0.257 ($p > 0.05$), indicating that there was insufficient evidence to show that the two distributions differ significantly. The mean ranks were slightly higher for teachers with a lesser length of service (33.40) than for those with a longer length of service (28.28). However, the difference is non-significant. This means that teaching experience does have a significant impact on the incorporation of LTE-SME in the curriculum.

Teachers who attended different numbers of relevant training courses were also significantly different from each other ($U = 221.00$, $p = 0.001$). Because the p-value is lower than 0.05, we reject the null hypothesis. In addition, teachers who attended many relevant training courses achieved a higher mean rank (37.87) than those who joined only a few of such training courses (22.62). This implies that relevant training greatly impacts teachers' instructional use of LTE-SME in their instructional integration.

In contrast, stratifying the data based on specialization showed no significant difference ($U = 378.00$, $p = 0.412$) as a p-value more than the level of significance at 0.05. Science teachers had a higher mean rank (32.75) than Mathematics teachers (29.00), but this difference is non-significant. Hence, specialization does not have a considerable effect on LTE-SME inclusion in the curriculum.

In conclusion, the results highlighted that among the profile variables examined in this research study, the highest educational attainment and the number of relevant training courses attended were found to have a significant effect on teachers' Utilization of LTE-SME integration in curriculum, while length of service and specialization were not.

Table 7
Level of Teachers' Utilization of LTE-SME in Assessment of Learning According to Variables

Variable	Category	N	Mean Rank	Mann-Whitney U test	p-value	*Sig. level*	Interpretation
Educational Attainment	Lower	22	30.05	408.00	0.877	0.05	Not Significant
	Higher	38	30.76				
Length of Service	Shorter	26	27.94	375.50	0.318		Not Significant

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	Longer	34	32.46			
Number of Relevant Trainings	Few	29	24.84	285.50	0.015	Significant
	Many	31	35.79			
Specialization	Science	24	35.50	312.00	0.068	Not Significant
	Mathematics	36	27.17			

Table 7 shows the level of teachers' Utilization of LTE–SME in Assessment of Learning when they are grouped according to highest educational attainment, length of service, number of relevant trainings attended, as well as specialization. The Mann–Whitney U test was used to investigate whether there were significant differences between groups. A p-value of 0.05, no difference between groups (p=0.318). The null hypothesis is accepted for this reason. This implies that teachers' utilization of LTE–SME in the assessment of learning is not meaningfully influenced by teaching experience.

For the number of relevant training courses attended, teachers who reported attending few trainings (n = 29) had a mean rank of 24.84, while those reporting many trainings (n = 31) attained a higher mean rank of 35.79, respectively. The p-value of 0.015 is below the level of significance at 0.05, suggesting a significant difference between the two groups. Then, the null hypothesis is rejected. The implication of this finding is that the frequency of relevant trainings attended significantly impacts teachers' Utilization of LTE–SME in the assessment of learning. Teachers who attended more relevant training showed higher usage.

Finally, based on specialization (Science teachers n = 24 and Mathematics teachers n = 36), the mean rank for Science teachers (n = 24) was 35.50, while for Mathematics it was 27.17. If we use a 0.05 significance level, the t-table value ≥ 0.068, thus there is no significant difference between Science and Mathematics teachers in terms of utilization of LTE-SME in assessment of learning. Thus, we accept the null hypothesis. This indicates that the area of specialization does not significantly affect how much instruction is utilized.

The results are aligned with the study of Shana & Abulibdeh (2020) where teachers who have an adequate number of relevant trainings increase learners' involvement in the laboratory. In the analyses conducted on the variables measured, only the number of relevant trainings experienced is a significant predictor of teachers' instructional use of LTE–SME in assessment of learning, while highest educational attainment, length of service, and specialization are not.

Relational Analysis between the Level of Teachers' Utilization of LTE-SME and the Level of Learners' Academic Performance

Table 8

Relationship between the Level of Teachers' Utilization of LTE-SME and the Level of Learners' Academic Performance

Variable	Rho	p-value	*Sig. level*	Interpretation
Utilization **Learners Academic Performance**	1.000	0.812	0.05	Not Significant

The Spearman rank correlation between the level of teachers' Utilization of LTE-SME and the level of learners' academic performance is shown in Table 22. For the analysis, the rho value is 1.000, and the p-value is 0.812, which falls under our significance level of 0.05. Since the p-value is greater than 0.05, the null hypothesis

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was not rejected, implying that there is no statistically significant relationship between the level of teachers' Utilization of LTE-SME and learners' academic performance.

The results indicate that there are no significant differences in secondary school learners' academic performance, which could be correlated with the varying extent to which teachers use LTE-SME in their instruction, at least within the context of this study. Put differently, whether LTE-SME was utilized by teachers does not seem to have a substantial effect on students' grades during SY: 2025-2026.

This is related to the study conducted by Schaffner et al. (2021) where there is no significant relationship between Utilization and students' academic performance. To add, they stressed that high tool or training utilization does not automatically translate into higher academic performance, and that teacher training does not automatically ensure improved student performance. Aligned with Warner et al.'s (2016) study, which shows that while hands-on instrumentation improves technical competence, utilization alone does not ensure higher academic performance. On the other hand, the results gathered in this study contrast with those of Shana & Abulibdeh (2020), which show that the availability and use of science tools and equipment directly enhance learning outcomes when properly implemented.

Conclusion

The study's major findings revealed that most teacher-respondents were highly educated, experienced, attended multiple relevant training courses, and were primarily Mathematics teachers. Overall, teachers demonstrated a High Level of Utilization of LTE-SME in terms of instrumentation, curriculum integration, and assessment of learning, indicating consistent use of learning tools across instructional practices regardless of their profile variables. However, significant differences were observed in some areas when grouped by educational attainment, length of service, and number of trainings attended, with trainings showing the most consistent influence, while specialization showed no significant differences across all areas. Students, on the other hand, achieved a Very Satisfactory level of academic performance during SY 2025–2026. Despite this, statistical analysis using Spearman's Rank Correlation showed no significant relationship between LTE-SME utilization and learners' academic performance, suggesting that other factors may influence student achievement. Overall, the conclusions indicate that while teachers effectively utilize LTE-SME in instruction, such utilization alone does not directly determine student academic performance. The foregoing results imply that maximizing the effectiveness of LTE-SME requires a systemic approach that integrates sustained resource provision, teacher capacity-building, and contextual learner factors, rather than relying solely on utilization to directly improve academic performance.

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Conflict of Interest

The author declares no conflict of interest related to the conduct, authorship, and publication of this research. All procedures and interpretations were performed independently, and no financial, professional, or personal relationships influenced the results of this study.

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