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Adequacy, Utilization of Laboratory Equipment and Performance of Junior High School Science Teachers

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Abstract
This research aimed to determine the relationship between laboratory equipment adequacy and utilization, and the performance levels of Science teachers in Malapatan Municipality. A descriptive quantitative approach was employed, utilizing surveys and observations to collect the data from 13 teachers across three districts, Malapatan Districts 1, 2 and 3. The study revealed that most teachers have Master of Arts in Education degrees in Science, a significant portion lacks in-service training, potentially limiting their effectiveness in using laboratory resources and teaching methods. The deficiency in Biology, Chemistry, Earth Science, and Physics equipment hinders Grade 9 Science teachers' ability to conduct hands-on experiments and practical demonstration crucial for teaching these subjects. Classifying skill shows high extent in utilizing the laboratory equipment while Observing, Inferencing, Experimenting, Predicting, Communicating, and General Questions require improvement. In terms of teaching performance, teachers excel in Physics but need improvement in Earth Science, Chemistry, and Biology. The weak positive correlation between equipment adequacy and teacher performance needs to be improved, indicating that additional factors such as teacher skills and resource availability play significant roles. The researcher developed a comprehensive and effective professional training program for science teachers to effectively utilize laboratory equipment and incorporate science process skills into teaching methods.

Keywords: Laboratory Equipment, Adequacy, Utilization, Performance Level, Professional training program

Introduction

The role of science education in the nation-building process cannot be overstated, particularly in both developed and developing nations as they strive to keep pace with the ever-evolving realms of science and technology. Mere knowledge acquisition is no longer sufficient; science education must transcend these boundaries. Laboratory activities, a cornerstone of science education, are indispensable for educators in the modern age. However, public high schools often grapple with challenges related to inadequate resources and their effective utilization, resulting to compromised academic performance among students and limited opportunities for hands-on learning experiences.

As Antonio (2018) underscores, laboratory activities are indispensable for effective learning, enabling students to move beyond passive observation to active engagement and profound comprehension. These activities serve as a vital bridge between theoretical knowledge and practical application, nurturing a comprehensive understanding of scientific concepts, while also enhancing students' problem-solving skills and scientific acumen (Yildiz & Arici, 2021; Karpudewan & Meng, 2017).

Nevertheless, Ngozi, Dike, Halima, and Salisu's (2015) study in Nigeria brings to light the scarcity of laboratory facilities in senior secondary schools, coupled with their underutilization. This deficiency has dire consequences for teaching, learning, and academic performance, firmly establishing a connection between the availability of laboratory resources and students' achievements. Limon (2016) corroborates these findings, emphasizing that inadequate laboratory facilities significantly hinder student performance, with little action taken by concerned authorities to rectify the situation.

In the Philippines, there is a growing call to enhance the quality of science and mathematics education in response to lackluster performance among Filipino students in these subjects. High-quality laboratory facilities play a pivotal role in this educational improvement, yet their absence in schools remains a pressing issue (Sanchez, Blanco & Farin, 2021; The Manila Times, 2014). The insufficiency of laboratory resources hampers effective teaching and learning, contributing to poor academic performance and a diminishing interest in science (Abas, 2020).

Inadequate laboratory facilities, which include shortages in chemicals, dedicated rooms, equipment, technical support, and well-structured manuals, pose significant obstacles to the successful execution of science education and students' scholastic accomplishments (Beyessa, 2014). The scarcity of laboratory facilities, along with limited access and the need for teacher improvisation, impedes the delivery of effective education (Ngozi, Dike, Halima, & Salisu, 2015; Pingol & Villanueva, 2015). This dearth of laboratories, coupled with an overemphasis on abstract learning at the expense of practical comprehension, can lead to diminishing interest in science courses and hinder the real-world application of knowledge (Kimba, Libata, & Usman, 2019).

A report by The Manila Times in 2014 underscores the severe shortage of science laboratory facilities in both elementary and high schools across the Philippines, with specific regions, including regions III, IV-A, X, XI, XII, and the National Capital Region, grappling with this issue. Consequently, this scarcity has resulted to subpar science and math education as evidence by consistently low achievement scores. Abas (2020) further accentuates these concerns, revealing that public schools in the Philippines suffer from inadequate laboratory rooms, subpar facilities, non-functional equipment, lack of learning materials, water supply issues, and unreliable electricity.

The significance of science laboratory materials and equipment in rendering science education more experiential cannot be overstated. They empower students with hands-on experiences, hone their scientific competencies, and deepen their comprehension of the natural world (Kimba, Libata & Usman, 2019; Suleiman, 2013). Regrettably, in the secondary schools of Malapatan Municipality, challenges persist regarding the adequacy and utilization of laboratory equipment. Students exhibit diminished interest and retention during practical activities, while educators grapple with the scarcity of suitable materials, occasionally resorting to traditional pedagogical methods such as the "stand and deliver" approach, where students passively receive information through notes, lectures, and textbooks.

In light of these issues, this research aimed to explore the relationship between laboratory facilities adequacy, utilization, and the performance levels of Science teachers in the secondary schools of Malapatan Municipality, Sarangani Division for the school year 2022-2023. Based on the findings of the study, the researcher developed a training program that may help increase the utilization of the laboratory facilities in the science subject and improve the processing skills of the students.

Literature Review

Laboratory facilities in science education serve as a cornerstone, offering students invaluable practical and visual learning experiences that stimulate creativity, ignite a passion for research, and instill a profound connection with nature and the environment (Huong Pham Thi et al., 2021; Sharpe & Abrahams, 2019; Khamali, Mondoh, & Kwena, 2017). These facilities foster the development of crucial competencies and skills, encompassing the art of formulating scientific questions, crafting investigations, constructing scientific interpretations, and defending robust scientific arguments.

In the context of fostering a robust educational landscape, the importance of modern, well-maintained instructional laboratories cannot be overstated. They stand as essential pillars for imparting knowledge in mathematics, basic sciences, and applied sciences, ultimately contributing to the creation of a skilled and scientifically literate human resource pool (Zengele & Alemayehu, 2016). Within these laboratories, practical activities become the bridge that connects theoretical knowledge to real-world applications. These hands-on experiences play a pivotal role in nurturing scientific literacy, preparing students for higher education, and deepening their grasp of scientific concepts by linking them to tangible, real-life scenarios (Marino, 2018).

Laboratory activities themselves are widely recognized as the linchpin of effective learning (Antonio, 2018). They empower students to transcend passive learning by actively engaging with the subject matter. In doing so, laboratory activities obliterate the gap between theory and practice, fostering a comprehensive understanding of intricate scientific concepts and significantly enhancing students' scientific acumen and problem-solving abilities (Yildiz & Arici, 2021; Karpudewan & Meng, 2017).

In the broader context, science education aspires to harness laboratory experiences to master subject content, amplify scientific reasoning abilities, deepen the comprehension of the complexities and uncertainties inherent in experimental work, and promote practical skills that kindle a genuine passion for the discipline (Rebunalan & Samala, 2021). The availability of well-equipped laboratory facilities enriches teaching capabilities, enabling educators to explore the full spectrum of science's teaching and learning processes. This, in turn, increases the likelihood of educators effectively conveying and explaining scientific facts, which students tend to appreciate more when drawn from hands-on investigations.

Hager (1974) and Lagoke (1997), as cited by Pareek (2019), have highlighted the significant impact of laboratory facilities on students' attitudes and academic performance, aligning with the principles of instructional theory regarding learning interaction. There is a prevailing belief that consistent practice leads to proficiency in the subjects students learn during classroom instruction, epitomized by the adage "practice makes perfect." Additionally, their studies have unveiled that the effective utilization of laboratory facilities in science instruction contributes to the development of values that assist learners in making informed decisions. Marino (2018) added that laboratory equipment and materials, such as anatomy models and science kits, facilitate hands-on learning and help students grasp complex scientific topics.

However, a significant impediment looms over many public schools in the Philippines—the dearth of equipment for conducting science experiments (Rebunalan & Samala, 2021). This equipment deficit hampers the practical application of scientific knowledge and impedes the fulfillment of science education's potential to its fullest extent.

Moreover, as per the discoveries made by Noroña (2021), it was evident that the majority of basic science laboratory facilities and resources were notably absent. Even among the limited resources that were accessible, their utilization was sporadic in the context of science instruction for Grade 11 students in the three secondary schools within the Eastern Samar school division during the 2019-2020 academic year. Further scrutiny of the data unveiled noteworthy discrepancies in the availability and usage of science laboratory resources across the three participating secondary schools.

In summary, laboratory facilities are integral to science education, providing students with hands-on learning experiences that foster creativity, a passion for research, and an appreciation for nature and the environment. Through laboratory activities, students develop essential competencies such as formulating scientific questions, designing investigations, constructing interpretations, and defending arguments. Modern, well-maintained laboratories are essential for teaching mathematics, basic sciences, and applied sciences, contributing to the development of a qualified and scientifically literate workforce. These practical activities enhance scientific literacy, prepare students for higher education, and connect scientific concepts to real-world applications. They bridge the gap between theory and practice, promoting a comprehensive understanding of science concepts and improving students' scientific skills and problem-solving abilities. Overall, laboratory facilities play a crucial role in nurturing students' love for science and enhancing their academic achievements.

K to 12 Basic Education Program Framework

The K to 12 Basic Education Program Framework serves as the blueprint for structuring education in the Philippines. It places emphasis on three interconnected elements: inquiry skills, scientific attitudes, and content and connections. The primary goal of this framework is to cultivate scientific literacy in students and infuse science and technology into various facets of life. The curriculum is designed to foster competencies that are pertinent to both the workforce and a knowledge-driven society. It adopts a student-centric and inquiry-driven approach, with a focus on substantiated explanations and the integration of concepts and skills across various fields (DepEd, 2019). Furthermore, the curriculum progressively introduces more intricate concepts and proficiencies in Life Sciences, Physics, Chemistry, and Earth Sciences through a spiral progression.

Moreover, according to Harve (2023), the K-12 Basic Education Program Framework not only improves students' proficiency in fundamental subjects and skills but also fosters independence. For instance, science education goes beyond theory, enabling students to manage scientific practices. Mastery of foundational concepts is essential for progress in any field, and with the help of modern educational technologies, educators can tailor support to individual student needs, ensuring no one falls behind in their educational journey.

However, according to the PISA 2018 where 7233 15-year-old Filipino students participated, the Philippines ranked as one of the poor-performing countries in science. The poor performance of Filipino students is reflected in the fact that around 77% of them did not reach the proficiency level (OECD, 2019a, 2019b)

Several factors contribute to subpar performance in science, encompassing the caliber of educators, the dynamics of the teaching-learning process, the school curriculum, the availability of instructional resources, and administrative support. One persistent challenge pertains to the deficiency of instructional materials, which significantly hampers the depth and significance of learning encounters (Ely, 2019).

Nevertheless, the National Academy of Sciences underscores the paramount importance of technology in addressing societal demands. Acquiring technological literacy is deemed essential for learners. In this context, educators are tasked with the responsibility of integrating digital technologies into their pedagogical approaches to enrich students' learning experiences and provide them with authentic, real-world insights (Kuehne, 2020).

In summary, the K to 12 Basic Education Program Framework in the Philippines emphasizes scientific literacy and the integration of science and technology into education. It employs an inquiry-driven approach, introducing progressively complex concepts in various scientific fields. Additionally, it fosters independence and practical skills among students, supported by modern educational technologies. Despite these efforts, the Philippines faces challenges in science education, as seen in poor student performance, which is attributed to factors like educator quality, teaching methods, curriculum, resource availability, and administrative support. Notably, the lack of instructional materials remains a persistent issue. Recognizing the importance of technology, educators are encouraged to incorporate it into teaching to enhance students' learning experiences and provide real-world insights.

Process Skills

In today's rapidly advancing world, science literacy is indispensable for active engagement in discussions surrounding scientific and technological advancements. It demands advanced knowledge, skills, and effective communication for meaningful participation in society. The cultivation of these competencies relies significantly on science and scientific process skills. When teachers prioritize curricula that highlight scientific process skills as specific learning outcomes, it enhances student learning (Firmansyah & Suhandi, 2021).

Teaching science necessitates a delicate balance between content and process components, with both being equally vital. While the subject matter and scientific concepts (content) are essential, so are the essential skills (process). Science process skills stand as crucial objectives in science education, as they are not solely the domain of scientists but are integral for anyone aspiring to become scientifically literate. Developed through analytical and critical thinking, these skills are the bedrock of scientific inquiry (Gultepe, 2015; Widestra & Yulkifli, 2021).

Science process skills are fundamental for knowledge acquisition and the application of scientific methods. These skills shape both teachers and students, influencing teaching approaches and classroom management. When teachers grasp the significance of science process skills, they employ diverse methods like practical work, laboratory activities, projects, problem-based learning, and discussions to impart these skills (Hikmah et al., 2018).

Science process skills are vital in science education, serving as the bedrock for success in scientific inquiry and practical activities. They provide the essential methodology for conducting scientific investigations in classrooms. These skills play a pivotal role in comprehending natural phenomena, addressing inquiries, forming theories, and acquiring knowledge, thereby fostering the development of ideas and academic excellence in science. Science process skills encompass primary abilities like observation, deduction, and measurement, as well as integrated competencies such as controlling variables, hypothesis formulation, and experiment interpretation. Through the application of these skills, students actively engage in information gathering, hypothesis testing, and the construction of well-founded scientific explanations (Firmansyah & Suhandi, 2021).

As mentioned in the literature presented, there are six (6) processing skills that need to be developed. One of those skills is observing or observation. Observation, a traditional research method, holds significance in middle school education as it nurtures students' fundamental skills and fosters creativity.

Enhancing students' observational prowess is essential and can be approached through various strategies (Yu & Li, 2018).

Another skill that needs to be developed by students is measuring. It's important to quantify our observations when measuring. When studying science in school, students initially learn how to measure five fundamental things: length, volume, mass (or weight), temperature, and time. They should have plenty of chances to quantify the data they get through experimentation and observation (Sharma et al., 2019).

Meanwhile, unlike observations, which are direct evidence gathered about an object, inferences are explanations or interpretations that follow from the observations. Through this skill, students are expected to make their own interpretations based on what they have observed and what they have previously experienced (Readingrocket, n.d).

Whereas, classification skills entail the ability to categorize or group objects or concepts based on their shared characteristics or distinctions. Rifqiawati, Wahyuni, & Rahman (2017) suggest that indicators of science process skills related to classification are evident when students can interpret experiences related to their immediate environment.

Predicting skills encompass the capacity to utilize students' existing knowledge to make informed judgments about potential outcomes when alterations occur in a given scenario. In the classroom, these skills can be nurtured by encouraging students to anticipate changes in their everyday environment through interactive discussions with their teacher (Ambross, Meiring & Blignaut, 2014). Lastly, in the context of science, communication skills entail conveying concepts, techniques, and information. To effectively share their observations with others, students must engage in clear and articulate communication to ensure that the information is comprehensible to the recipient (Readingrocket, n.d).

In addition, the K-12 Basic Education Curriculum as cited by SEI-DOST & UP NISMED (2011) emphasizes the integration of science content and science processes. Learners need the context provided by content to effectively utilize science process skills. The curriculum aims to motivate students by organizing learning around real-life situations and problems, encouraging hands-on, minds-on, and hearts-on activities, and promoting active learning beyond textbooks.

The development of science process skills is crucial for students to acquire proper scientific attitudes, values, and problem-solving abilities. These skills enhance logical thinking, questioning, and problem-solving in daily life. Process skills are especially significant in inquiry-based learning, enabling students to conduct scientific investigations and develop an understanding of scientific concepts (Nursalam et al., 2022).

According to the Classroom Observation Tool for teacher 1,2 and 3 school year 2020-2021, there were seven levels for the rubric summary. Namely organizing (3), developing (4), Applying (5), Consolidating (6), Integrating (7) and "NO" stands for Not Observed which automatically gets a rating of 3 (Details in Appendix I).

In conclusion, science literacy is essential for meaningful participation in discussions about scientific and technological advancements. It demands advanced knowledge, skills, and effective communication. Teaching science requires a balance between content and process components, with both being equally vital. Science process skills are crucial for comprehending natural phenomena, addressing inquiries, forming theories, and acquiring knowledge. These skills are fundamental for students' development, influencing teaching approaches and classroom management. Prioritizing curricula that highlight scientific process skills enhances student learning and fosters scientific attitudes and values, promoting logical thinking, questioning, and problem-solving in daily life. The integration of science content and processes in the K to12 Basic Education Curriculum aims to motivate students through real-life situations, hands-on activities, and active learning, fostering an understanding of scientific concepts.

Professional Training/Program

Teacher education programs play a pivotal role in the education system, particularly in science education. The laboratory experiences of aspiring science teachers have a profound impact on their motivation to apply scientific principles in the classroom. These hands-on experiences, which involve direct interaction with the natural world, are indispensable for effective science education. A teacher's comprehension of laboratory experiences holds significant implications for science instruction and learning. Their perspectives on science education shape their teaching approach and responsiveness to students' learning needs. To successfully incorporate laboratory experiences into teaching, fostering students' curiosity and proficiency in scientific processes, it is imperative that teachers receive adequate preparation during their education and ongoing opportunities for professional growth (Prabha, 2016).

Becoming an effective science teacher is an ongoing process that extends from initial training to a lifelong professional career (Wollmann & Schubert, 2022). Given the dynamic nature of science, teachers require continuous opportunities to enhance their understanding and pedagogical skills, especially in addressing the diverse ways in which students comprehend scientific concepts (Amolins, 2015). Developing proficient science educators necessitates a comprehensive approach that extends beyond subject knowledge, focusing on broader professional development grounded in constructivist principles, promoting student-centered and inquiry-based instruction. As Daehler (2016) cited in Rebunalan and Samala's study notes, effective science lessons require meticulous planning, engagement with complex concepts, and consideration of students' preconceptions and biases, highlighting the artistry inherent in skilled teaching.

Integrating the nature of science instruction into classrooms presents teachers with various challenges, including limited conceptual content knowledge, a lack of expertise in inquiry-based teaching, and difficulties in designing the new nature of science activities (Wahbeh & Abd El Khalick, 2013). To address these obstacles, science teacher educators should assist teachers in developing a deep, interconnected knowledge base in science and explore pedagogical approaches that facilitate professional growth (Parrish, 2017). The role of Continuing Professional Development (CPD) is pivotal in preparing teachers to adapt to evolving educational trends, learning technologies, and scientific methodologies. CPD represents an ongoing, systematic process that enhances professionals' knowledge, expertise, and competence throughout their careers (Ebong, Ogwo, & Nwachukwu, 2022).

In conclusion, ensuring a high-quality science teacher workforce necessitates both high-quality teaching in teacher education programs and ongoing professional development opportunities. It is imperative to offer meaningful professional development opportunities to all K-12 science teachers and science educators, fostering their learning and growth throughout their careers (King, 2021).

Conceptual Framework

The study's conceptual framework illustrated in Figure 1, provides a structured framework for assessing the adequacy and utilization of laboratory equipment and the performance of Grade 9 Science teachers in Malapatan Districts 1, 2, and 3. Specifically, it focuses on the availability and utilization of laboratory equipment by teachers of Grade 9 science classes, encompassing subjects like biology, chemistry, earth science, and physics. The initial phase of the study involves evaluating the level of adequacy of laboratory equipment within the schools across the districts, followed by an exploration of how this availability influences the extent of equipment utilization, particularly concerning specific process skills such as observation, classification, inference, prediction, experimentation, and communication.

Furthermore, the study delves into an assessment of the Grade 9 Science teachers' performance in facilitating laboratory activities, taking into account various factors including their educational qualifications, years of teaching experience, and participation in in-service training. This multifaceted analysis aims to uncover relationships between these variables, ultimately leading to the proposal of a targeted professional training program for science teachers in Malapatan Districts 1, 2, and 3. Such a program aims to enhance the quality of science education in the region, thereby benefitting both teachers and students alike. This proposed program, informed by empirical data and rigorous analysis, aspires to bridge the gaps, enhance performance, and elevate the overall quality of science education delivery. Consequently, it holds the potential to positively impact both educators and students, fostering an environment of excellence and innovation in science education.

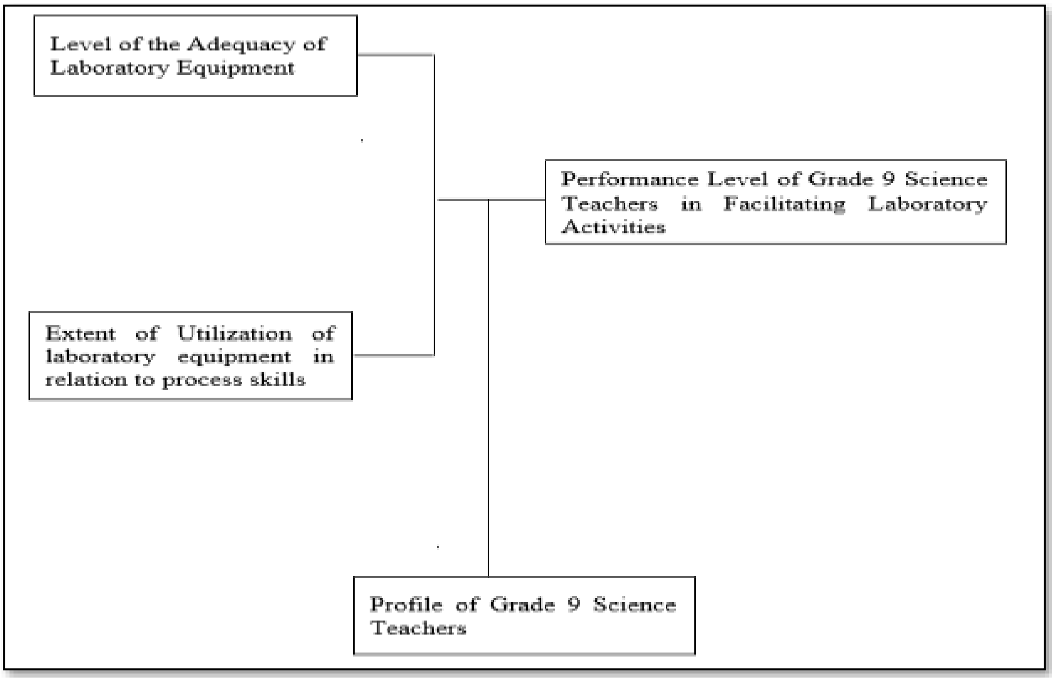

Figure 1. Conceptual Framework

Significance of the Study

This study is hoped to have significant implications for various stakeholders:

School Administrators. School administrators may utilize the study's outcomes to develop interventions, programs, and trainings that enhance teachers' and students' learning. It may guide them in selecting quality instructional materials and equipment for science education.

School Heads. School heads, responsible for effective school management and academic leadership, may use the findings for curriculum development and for determining effective teaching strategies. This may help lead to improved student outcomes and help prioritize funding and resources for science-related improvements.

Parents. Parents may have a better understanding of the importance of science education and its impact on their child's future through the study's findings.

Teachers. Teachers may gain insights to help address the inadequacy of laboratory facilities as a hindrance to students' academic performance. This knowledge may further help them to improve their understanding of the subject matter, to consider teaching effectiveness, and to be updated with current trends and best practices in science education.

Students. Students may be helped become more active and participative as teachers incorporate the utilization of laboratory facilities in the teaching-learning process. This learning exposure enhances their practical skills, problem-solving abilities, and scientific inquiry. It fosters engagement, and better student outcomes, and prepares them for future studies or careers in science.

Researcher. The researcher gains a wide range of knowledge and practical skills contributing to the advancement of knowledge in the field. The study provides new insights and deeper understanding of science education helping the researcher handle science class challenges.

Future Researchers. Future researchers may benefit from the study's direction, comprehending the study's processes and opening new opportunities for collaboration and sharing best practices. The findings may inspire them to explore new research topics, to enhance existing knowledge, and to contribute to the field of science. The study's findings may also be used for comparison with confirmation to or support in future research endeavors.

Statement of the Problem

This research aimed to determine the relationship between laboratory equipment adequacy, utilization, and the performance levels of Science teachers in the Municipality of Malapatan.

Specifically, the study answered the following questions:

1. What is the profile of the Grade 9 Science teachers in terms of the following:

1.1 Educational qualifications,

1.2 Number of years in teaching, and

1.3 In-service training?

2. What is the level of the adequacy of the laboratory equipment in science in support of the requirements for the curriculum guide for Grade 9 Science teachers in the following areas:

2.1 Biology,

2.2 Chemistry,

2.3 Earth Science, and

2.4 Physics?

3. What is the extent of the utilization of the different laboratory equipment in relation to the following process skills:

3.1 Observing,

3.2 Classifying,

3.3 Inferencing,

3.4 Predicting,

3.5 Experimenting, and

3.6 Communicating?

4. What is the performance level of the Grade 9 Science teachers in facilitating laboratory activities in the following areas:

4.1 Biology,

4.2 Chemistry,

4.3 Earth Science, and
4.4 Physics?
5. Is there a significant relationship between:
5.1 the level of adequacy of the laboratory equipment and performance level of Grade 9 Science teachers; and
5.2 extent of the utilization and performance level of the Grade 9 Science teachers?
6. Based on the findings of the study, what training program can be developed?

METHODOLOGY

Research Design

This study utilized the descriptive quantitative research design. Descriptive research design serves as a potent instrument employed by researchers for the purpose of acquiring information regarding a specific group or phenomenon. This research design enables the creation of a comprehensive and precise portrayal of the attributes and actions exhibited by a particular population or subject. Through the process of observation and data collection pertaining to a chosen subject, descriptive research facilitates an enhanced comprehension of a particular matter and offers valuable insights that can shape subsequent investigations (Sirisilla, 2023).

Through this research design, a quantitative analysis was sought to determine the teacher profile of the grade 9 Science teachers, the level of adequacy and the extent of utilization of laboratory equipment in the different process skills. This design also measured the performance level of Grade 9 Science teachers in facilitating the laboratory activities of Biology, Chemistry, Earth Science, and Physics in the Municipality of Malapatan, Districts 1, 2, and 3. After analyzing and interpreting the results, a training program was developed to address the specific needs and challenges identified in the areas of teacher qualifications, laboratory equipment adequacy, utilization, and performance to enhance the overall quality of science education in Junior High School.

Respondents of the Study

The respondents of the study were chosen purposively satisfying the following criteria: a Science teacher, a teacher serving in any secondary school under any of the three districts of Malapatan municipality, and has handled Grade 9 Science subjects. Thus, the Grade 9 Science teachers

There were a total of 13 respondents coming from all districts. Specifically, in Malapatan 1 district, Malapatan National High School had 3 identified Grade 9 Science teachers. Datu Pangolima Integrated School had 1 identified Grade 9 Science teacher. Malapatan 2 district which includes PH Millona Integrated School, Tuyan Integrated School, Fracisco Cagang Integrated School, and Libi Integrated School had 1 identified Grade 9 Science teacher. Malapatan 3 district which has, Lun Padidu National High School had 3 identified Grade 9 Science teachers. Amado Quirit National High School and Kinam National High School have 1 identified Science teacher teaching Grade 9 science subject.

The researcher considered all (100%) of the Grade 9 Science teachers who were teaching the science subject for the School Year of 2022-2023.

The respondents of the study were from the 3 districts of Malapatan Municipality. Each school had a population and sample of 1 except for Lun Padidu National High School and Malapatan National High School which had 3 science teachers representing their school.

Box 1

The Number of Grade 9 Science teachers in Malapatan Districts 1, 2, and 3

Schools	Number of Respondents
Malapatan National High School	3
Datu Pangolima Integrated School	1
PH Millona Integrated School	1
Tuyan Integrated School	1
Fracisco Cagang Integrated School	1
Libi Integrated School	1
Lun Padidu National High School	3
Amado Quirit National High School	1
Kinam National High School	1
Total	13

Research Instruments

The research utilized a customized survey questionnaire which was validated by the experts and distributed to the respondents. The tool was a four-part survey questionnaire. The first part of the survey questionnaire was intended to collect data on the educational profile of the Science teachers including their educational qualifications, the number of years in teaching, and In-service training.

The second part of the survey questionnaire determined the level of adequacy of laboratory equipment for Grade 9 Science for the following subjects: Biology, Chemistry, Earth Science, and Physics. To determine the adequacy of the equipment in the science laboratory of the school, the researcher utilized a Yes or No type of questionnaire. The "yes" responses indicated that the identified Science equipment is available and on the contrary, the "no" responses indicated that the Science equipment is not available in the laboratory.

Furthermore, the third part of the questionnaire which has 35-questions (see Appendix G) was intended to determine the extent of utilization of laboratory equipment in terms of these process skills: Observing, Classifying, Inferencing, Experimenting, Predicting, and Communicating. The rating scale as presented below was used to interpret the results.

Box 2

Scale of the Extent of Utilization of Laboratory Equipment

Scale	Verbal Interpretation
5	Very High in Extent
4	High in Extent
3	Moderate in Extent
2	Low in Extent
1	Least in Extent

The fourth part of the survey questionnaire determined the performance level of the Grade 9 Science teachers in facilitating laboratory activities. The data were collected from the master teachers of the respondent schools. They conducted the classroom observations using class observation tools.

The teaching performance of the science teachers were evaluated using the scale presented in the next page.

The tool was validated through perusal validation by the five (5) experts in the field of education who presented recommendations for significant item changes**.** Moreover, statistical validation for the test of validity (spearman brown) and test of consistency (Cronbach alpha) were utilized.

Box 3
Scale for Teaching Performance

Level	Level Name	Description
3	Organizing	The teacher demonstrates a limited range of loosely associated pedagogical aspects of the indicator.
4	Developing	The teacher demonstrates a range of associated pedagogical aspects of the indicator that sometimes align with the learners' developmental needs
5	Applying	The teacher demonstrates a range of associated pedagogical aspects of the indicator that usually align with the learners' developmental needs.
6	Consolidating	The teacher uses well-connected pedagogical aspects of the indicator consistently aligned with student development that supports students to be successful learners.
7	Integrating	The teacher uses well-connected pedagogical aspects of the indicator to create an environment that addresses individual and group learning goals.

The researcher conducted a face-to-face distribution of the survey questionnaire to the respondents. A secured letter was attached to the questionnaires upholding the privacy and confidentiality of the participants in the study.

Data Gathering Procedure

The researcher prepared the data collection tools, obtained necessary recommendations and permissions, contacted concerned authorities, assembled respondents, distributed survey forms, gathered, and completed questionnaires. Specifically, the researcher followed the following steps to collect data for the study. First was the preparation of tools. The researcher designed the necessary tools for data collection, including a modified survey questionnaire validated by the experts. Then, to obtain a recommendation and approval, the researcher drafted a letter to request a recommendation from the Division Office of Sarangani for the conduct of the study. The letter sought permission from the school division Superintendent which was noted by the thesis adviser and supported by the communication with the Division Supervisor and School Principals. When the recommendation was granted, the researcher wrote a letter addressed to the Public-School Division Supervisor assigned to each district, as well as the School Principals of the identified schools. This letter was supported by the recommendation letter from the Office of the Schools Division Superintendent. After obtaining the necessary approval, the researcher gathered potential respondents for data collection. On a designated date, survey forms were distributed to the respondents who were requested to answer them appropriately. Finally, the data gathered were analyzed using statistical treatment methods.

Data Analysis

The statistical tools that were utilized by the researcher were the following:

To analyze the data on the profile of the Grade 9 Science teachers, a frequency distribution was used, to determine the level of the adequacy of the laboratory

Box 4
Criteria for the Level of Adequacy of Adequacy of Science Laboratory Equipment

Mean Range	Interpretation	Description
1.00-1.59	Adequate	The science laboratory equipment is enough for the purpose of instruction in a particular subject.
1.60-2.59	Inadequate	The science laboratory equipment is not enough for the purpose of instruction in a particular subject.
2.60-3.00	Unavailable	The science laboratory equipment is required for the purpose of instruction in a particular subject.

equipment in science in support of the requirements for the curriculum guide for Grade 9 Science teachers, a Criteria for the Level of Adequacy of Adequacy of Science Laboratory Equipment in Box 4 was used, to determine the extent of the utilization of the different laboratory equipment, Criteria for the Extent of Utilization was used in Box 5, in relation to identified process skills, and the performance level of the Grade 9 Science teachers in facilitating laboratory activities, frequency distribution table using Likert Scale was used. The acceptance point for the items was 2.50 and any mean below 2.50 was regarded as rejected, not prevalent, and unpopular view.

Box 5
Criteria for the Extent of Utilization

Mean Range	Interpretation	Description
4.21-5.20	Very High in Extent	The extent is rated very high at 80-100%
3.41-4.20	High in Extent	The extent is rated high at 60-79%
2.61-3.40	Moderate in Extent	The extent is rated moderate at 40-39%
1.81-2.60	Low in Extent	The extent is rated Low at 20-39%
1.00-1.80	Very Low in Extent	The extent is rated Very Low at 0-19%

In the context of the study, these criteria were used to systematically evaluate the laboratory equipment in schools within Malapatan Municipality. The assessment based on these criteria allowed researchers to draw conclusions about the adequacy of laboratory resources and make recommendations for improvements.

For the significant relationship between the level of adequacy and the laboratory equipment and performance level of Grade 9 Science teachers and the extent of the utilization and performance level of the Grade 9 Science teachers, the Criteria for the Performance Level in Box 6 was used.

Box 6
Criteria for the Performance Level

Mean Range	Level	Description
3.00-3.99	Organizing	The teacher demonstrates a limited range of loosely associated aspects of the indicator.
4.00-4.99	Developing	The teacher demonstrates a range of associated pedagogical aspects of the indicator that sometimes align

		with the learners' developmental needs.
5.00-5.99	Applying	The teacher demonstrates a range of associated pedagogical aspects of the indicator that usually align with the learners' developmental needs.
6.00-6.99	Consolidating	The teacher uses well-connected pedagogical aspects of the indicator consistently aligned with the student development that supports students to be successful learners.
7.00-7.99	Integrating	The teacher uses well-connected pedagogical aspects of the indicator to create an environment that addresses individual and group learning goals.

Ethical considerations

The following ethical considerations were taken into account throughout the study:

First, informed consent was obtained from all participants, the Grade 9 science teachers. They were provided with clear and comprehensive information about the study's purpose, potential risks and benefits, voluntary participation, confidentiality, and their right to withdraw at any time without facing any consequences. Confidentiality and anonymity were ensured to protect the participants' personal information and data. Unique identifiers were used instead of personal identifiers to maintain anonymity. Data were securely stored and shared only with authorized personnel involved in the study. Voluntary participation was emphasized, and no coercion or pressure was exerted on the teachers to participate. They were assured that their decision to participate or not will not affect their employment or any other aspect of their professional standing.

Respect for privacy was maintained by conducting the study in a manner that minimized disruptions to the teachers' teaching and classroom activities. Permission was obtained from school administrators, and efforts were made to ensure that observations and data collection did not intrude upon the privacy of teachers or students. Precautions were taken to minimize any potential harm or discomfort to participants. The study was designed in a way that does not negatively impact the teachers' professional reputation, student learning, or overall well-being. Adherence to all relevant legal and ethical guidelines, including those established by school boards or ethics committees, was ensured. Familiarity with the ethical standards specific to the research field was maintained, and compliance was upheld throughout the study.

When reporting and disseminating the findings, accuracy and objectivity were prioritized. There was no misrepresentation or fabrication of data. Participants' identities remained confidential, and the data were presented in a way that cannot be linked back to individual teachers or schools without their explicit permission. Continuous monitoring and review of ethical considerations were carried out throughout the research process. Feedback from participants and relevant stakeholders was welcomed, and any ethical concerns that arose during the research were addressed promptly. By meticulously addressing these ethical considerations, the study was conducted in a manner that respects the rights and well-being of the Grade 9 science teachers while ensuring the integrity and validity of the research findings.

RESULTS

This chapter presents the findings of the study which includes the profile of Grade 9 science teachers, the level of adequacy of the laboratory equipment, the extent of utilization of the different laboratory equipment and the performance level of the grade 9 science teachers in facilitating laboratory activities in Biology, Chemistry, Earth Science and Physics.

Profile of Grade 9 Science Teachers

Table 1
Profile of the Respondents

Indicator	Frequency	Percentage
Educational Qualifications		
Diploma in Teaching Non-Science Degree	1	7.69
MA Ed Science Degree	5	38.46
MA Ed Non-Science Degree	4	30.77
MA Ed Science Units	2	15.38
Master in Biology Non-Thesis	1	7.69
Total	13	100.00
Years in Teaching		
1 – 5	7	53.85
6 – 10	4	30.77
11 – 15	1	7.69
16 – 20	1	7.69
Total	13	100.00
In-Service Training		
INSET for Teachers Science Investigatory Project	1 1	7.69 7.69
None	11	84.62
Total	13	100.00

Table 1 shows that the teacher-respondents from Malapatan Districts 1, 2, and 3 earned Master of Arts in Education major in Science (Science Education, and Biological Science) with a frequency of 5 and a percentage of 38.46%; Master of Arts in Education Non-Science degree with a frequency of 4 and a percentage of 30.77%; Master of Arts in Education Science Units with a frequency of 2 and a percentage of 15.38%; and Diploma in Teaching Non-Science Degree and Master in Biology Non-Thesis with a frequency of 1 and percentage of 7.69%, respectively. With most teacher-respondents holding Master of Arts in Education degrees majoring in Science, there is a potential alignment between their academic background and the subject they teach, which could enhance their ability to utilize laboratory facilities and provide quality instruction effectively. Conversely, the teacher-respondents with non-science degrees or those holding diplomas in teaching without Science specialization underscore the importance of targeted professional development to bridge knowledge gaps and ensure the optimal utilization of laboratory resources.

In terms of years of teaching, the findings revealed that the teacher- respondents have 1 to 5 years of teaching experience with a frequency of 7 and a percentage of 53.85%; 6 to 10 years of teaching experience with a frequency of 4 and a percentage of 30.77%; and 11 to 15 and 16 to 20 years of teaching experience with a frequency of 1 and a percentage of 7.69%, respectively. While teachers with fewer years of experience may bring fresh perspectives and enthusiasm to their teaching, they may also require additional support and training in effectively utilizing laboratory resources. Conversely, some educators with 6 to 20 years of experience suggest a reservoir of pedagogical expertise that can be harnessed to enhance the utilization of laboratory facilities.

In terms of in-service training, the study outcomes revealed that the teacher-respondents have no in-service training with a frequency of 11 and a percentage of 84.62%; and have INSET for teachers and Science Investigatory Project with a frequency of 1 and a percentage of 7.69%. The findings revealed that 84.62% have not training. This finding bears significant implications on the adequacy of laboratory facilities and teaching performance. The absence of ongoing professional development may hinder teachers' ability to utilize laboratory resources and adopt modern teaching methodologies effectively. Hence, it shows a potential gap in their knowledge and skills which could impact their teaching performance.

Mean and Level of Adequacy of Laboratory Equipment.

Table 2

Adequacy of Laboratory Equipment

Laboratory Equipment	Mean	Standard deviation	Level of Adequacy
Biology	1.8	0.3	Inadequate
Chemistry	1.6	0.3	Inadequate
Earth Science	1.3	0.2	Unavailable
Physics	1.4	0.4	Unavailable

Table 2 shows the level of adequacy of laboratory equipment. The findings revealed that Biology and Chemistry have an inadequate laboratory equipment with a mean score of 1.8 and 1.6 respectively. On the other hand, there is no available laboratory equipment in Earth Science and Physics with a mean score of 1.3 and 1.4 respectively. This implied that the low mean scores in these subjects highlight a critical deficiency in essential resources for effective science education. This inadequacy severely hinders teachers' ability to conduct hands-on experiments and practical demonstrations which are integral to teaching these subjects.

The Extent of Utilization of Different Laboratory Equipment

Table 3

Utilization of Laboratory Equipment

Process Skills	Mean	Standard deviation	Interpretation
General Questions	2.3	0.9	Low in Extent
Observing	3.3	1.1	Moderate in Extent
Classifying	3.7	1.2	High in Extent
Inferencing	3.3	1.0	Moderate in Extent
Predicting	3.0	1.0	Moderate in Extent
Experimenting	3.1	1.1	Moderate in Extent

Table 3 reveals that the extent of utilization of different laboratory equipment in terms of classifying has a high extent with a mean score of 3.7. On the other hand, there is a moderate extent of utilization of different laboratory equipment in terms of Observing, Inferencing, Experimenting, and Predicting with a mean score of 3.3, 3.3, 3.1, and 3.0 respectively. Lastly, there is a low extent of utilization of different laboratory equipment in terms of general questions with a mean score of 2.3. This implies that the high extent of laboratory equipment utilization observed in Classifying highlights a strong foundation in this particular scientific inquiry, potentially indicating effective teaching practices or resource allocation. However, the moderate to low extents of utilization in Observing, Inferencing, Experimenting, Predicting, and General Questions underscore areas where improvement is needed.

The Performance Level of the Grade 9 Science teachers

Table 4 shows the mean performance level of the Grade 9 Science teachers of Malapatan Districts 1, 2, and 3. The results revealed that the performance level of the Grade 9 Science teachers of Malapatan Districts 1, 2, and 3 in Physics is consolidated with a mean score of 6.5.

Table 4

The Performance Level of the Grade 9 Science teachers

Subject Area	Mean	Standard deviation	Level of Adequacy
Biology	4.2	1.6	Developing
Chemistry	4.6	1.8	Developing
Earth Science	4.9	1.9	Developing
Physics	6.5	1.1	Consolidating

On the other hand, the performance level of the Grade 9 Science teachers of Malapatan Districts 1, 2, and 3 in Earth Science, Chemistry,and Biology is developed with a mean score of 4.9, 4.6, and 4.2, respectively. Hence, the findings indicate that Grade 9 Science teachers in Malapatan Districts 1, 2, and 3 demonstrate a relatively strong performance in Physics, suggesting a high level of competence in teaching this discipline. In contrast, their performance levels are developed in Earth Science, Chemistry, and Biology but still areas for improvement due to relatively low mean scores.

Correlation between Levels of Adequacy and Performance Level

Table 5 presents the correlation between the level of adequacy of laboratory equipment and the Performance Level of Grade 9 Science teachers of Malapatan Districts 1, 2 and 3.

Table 5

Correlation between Levels of Adequacy and Performance Level

<table>
<tr><td colspan="3"></td><td>PL</td><td>AL</td></tr>
<tr><td rowspan="6">Spearman's rho</td><td rowspan="3">PL</td><td>Correlation Coefficient</td><td>1.000</td><td>.476</td></tr>
<tr><td>Sig. (2-tailed)</td><td>.</td><td>.100</td></tr>
<tr><td>N</td><td>13</td><td>13</td></tr>
<tr><td rowspan="3">AL</td><td>Correlation Coefficient</td><td>.476</td><td>1.000</td></tr>
<tr><td>Sig. (2-tailed)</td><td>.100</td><td>.</td></tr>
<tr><td>N</td><td>13</td><td>13</td></tr>
</table>

The findings revealed that there is a low positive correlation between the level of adequacy of laboratory equipment and the Performance Level of Grade 9 Science teachers (r(11) = 0.476) but the correlation is not significant (p = 0.1) at $\alpha = 0.05$. The low positive correlation suggests a weak relationship between the two variables.

Correlation between the Extent of Utilization and Performance Level

Table 6
Correlation between the Extent of Utilization and Performance Level

			PL	EU
Spearman's rho	PL	Correlation Coefficient	1.000	-.438
		Sig. (2-tailed)	.	.134
		N	13	13
	EU	Correlation Coefficient	-.438	1.000
		Sig. (2-tailed)	.134	.
		N	13	13

Table 6 shows the correlation between the extent of utilization and the Performance Level of Grade 9 Science teachers of Malapatan Districts 1, 2 and 3. It was revealed that there is a low negative correlation between the extent of utilization and the Performance Level of Grade 9 Science teachers (r(11) = -0.438) but the correlation is not significant (p = 0.134) at $\alpha = 0.05$.

DISCUSSIONS

This chapter presents the justification of the results of the study. The implications are derived from the analysis and interpretation and from the conclusions and the recommendations.

Justification of Results

Profile of Grade 9 Science teachers Educational Qualifications

The results revealed that most teacher-respondents from Malapatan Districts 1, 2, and 3 hold Master of Arts in Education degrees majoring in Science. This finding indicates a potential alignment between their academic background and their teaching subject. This alignment enhances their ability to utilize laboratory facilities and provide quality instruction effectively. Teachers with a solid academic background in Science are more likely to have an in-depth understanding of the subject matter, the skills and knowledge necessary to teach effectively. They are also more likely to know the latest scientific research and teaching practices. These factors lead to a more engaging and effective teaching and improved student outcomes.

In addition, teachers who specialized in Science are likely to be more skilled in using laboratory facilities. This is important, as laboratory experiments are vital in Science education. They allow students to learn about scientific concepts and processes and to develop their scientific inquiry skills. However, the findings also revealed that many teacher-respondents are non-science degree holder and have diplomas in teaching without Science specialization. This finding suggests a need for targeted professional development to bridge these knowledge gaps. Professional development programs can help teachers develop knowledge of Science content, pedagogy and skills in using laboratory facilities. This professional development helps ensure that all students have access to high-quality Science education, regardless of the academic background of their teachers.

Similarly, the study of Monch and Markic (2022), revealed that there is a positive correlation between teachers possessing a higher level of science topic knowledge and their utilization of effective science teaching strategies, as well as the subsequent enhanced learning outcomes observed among their pupils. Moreover, it is emphasized that teachers with greater scientific topic understanding are more adept at clarifying complex ideas to students, addressing their inquiries, and developing compelling and demanding educational activities.

Years in Teaching

The findings showed that most teacher-respondents have 1 to 5 years of teaching experience. This finding revealed that many of the teachers are relatively new to the profession. Although teachers with fewer years of experience may offer new perspectives and excitement in their instruction, they may also need further training and support in efficiently utilizing laboratory resources. Laboratory experiments can be complex and require specialized knowledge and skills. Teachers with less experience may have yet to have the opportunity to develop these skills. They may also need help designing and implementing practical laboratory activities that align with the curriculum and learning outcomes.

Furthermore, the study revealed that many teacher-respondents possess a teaching tenure ranging from 6 to 20 years. These educators are more inclined to have a profound comprehension of the subject area and the competencies and expertise required to deliver effective instruction in Science. They are also more likely to be familiar with various teaching methods and strategies, including those involving laboratory facilities. Teachers with more experience are also more likely to have a reservoir of pedagogical expertise that can be harnessed to enhance the utilization of laboratory facilities. They may have developed innovative ways to use laboratory equipment and materials to teach Science concepts. They may also have developed effective strategies for managing and supervising students in the laboratory setting.

Similarly, the study of Osborne and Dillon (2022) revealed that new instructors frequently exhibit notable enthusiasm when using laboratory resources in their instructional practices. Nevertheless, individuals may also indicate a need for more practical expertise and comprehensive understanding, essential for effectively utilizing those resources. It is also recommended that novice educators receive extensive training and ongoing assistance to enhance their proficiency in using laboratory resources.

In-service training

The findings regarding the lack of in-service training among the teacher- respondents, with 84.62% having no such activity, bear significant implications for the adequacy of laboratory facilities and teaching performance. In-service training is essential for teachers to stay up-to-date on the latest teaching methods and technologies, including those related to the use of laboratory facilities. With regular in-service training, teachers may have the knowledge and skills to effectively utilize laboratory resources and provide high-quality Science education to their students.

A lack of in-service training may also hinder teachers' ability to adopt modern teaching methodologies that are more effective in promoting student learning. For example, inquiry-based learning and project-based learning are two current teaching approaches that can be used to enhance laboratory instruction. However, these approaches require teachers to have a strong understanding of Science content and pedagogy and the skills to design and implement practical laboratory activities.

The study of Duban et al. (2019) emphasized that the implementation of professional development programs can effectively enhance the proficiency of science educators in utilizing laboratory resources, hence facilitating their instructional practices. The research showed that engaging in professional development programs can enhance teachers' abilities to effectively plan and execute hands-on laboratory experiments, ensure the safe and efficient utilization of laboratory equipment, effectively supervise students within the laboratory setting, and accurately evaluate student learning outcomes.

Level of the adequacy of the laboratory equipment in science

Biology

A mean score of 1.8 for the adequacy of laboratory equipment in science in support on the requirements for the curriculum guide for Grade 9 Science teachers in Biology indicates that the equipment is inadequate. This is a significant concern, as laboratory experiments play a vital role in Science education. They allow students to learn about scientific concepts and firsthand processes to develop their scientific inquiry skills. Inadequate laboratory equipment can limit the scope and depth of students' laboratory experiences especially in Biology. For instance, if there are not enough microscopes for all students, they may be unable to participate in activities requiring them to observe microscopic specimens. This could hinder their understanding of critical biological concepts like cell structure and function. In addition, inadequate laboratory equipment can lead to difficulties to teachers' implementation of the curriculum effectively. If teachers cannot access the necessary equipment, they may have to modify or omit laboratory activities altogether. This could deprive students of valuable learning opportunities.

Shana and Abulibdeh (2020) examine the significance of laboratory work within the context of biology education. The authors suggest that including laboratory activity in educational settings facilitates experiential learning, fostering a more profound comprehension of biological principles among students. Additionally, it is asserted that engaging in laboratory work might promote the cultivation of essential scientific competencies such as observation, experimentation, and prediction among students.

Chemistry

The obtained mean score of 1.6, which reflects the adequacy of laboratory equipment in the field of science, specifically in support of the curriculum guide for Grade 9 Science teachers in Chemistry, suggests that the equipment is significantly inadequate in meeting the necessary standards. The matter is of considerable importance, given that laboratory equipment is crucial in adequately instructing Chemistry. Chemistry is classified as a laboratory-based scientific discipline, necessitating the practical execution of experiments to facilitate students' comprehension and assimilation of fundamental concepts and theoretical frameworks. Laboratory activities allow students to see chemical reactions and directly cultivate their scientific research aptitude. More laboratory equipment must be needed to restrict the extent and comprehensiveness of students' laboratory experiences. For instance, in the event of an insufficient supply of beakers, test tubes, or other fundamental glassware for all pupils, their ability to engage in activities that involve the execution of elementary chemical reactions may be compromised. This situation has the potential to impede students' comprehension of crucial principles in Chemistry, including chemical bonding and stoichiometry.

The study of Sugano et al. (2019) provides a comprehensive meta-analysis of a collection of papers investigating the effects of laboratory-based learning in chemistry education. The article explores the impact of laboratory experiments on students' understanding of chemical reactions, foundational concepts, and their cultivation of scientific inquiry skills. The authors suggest that including laboratory activity in chemistry education facilitates student learning through experiential engagement.

Earth Science

The mean score of 1.3 for the adequacy of Earth Science laboratory equipment indicates that there is no available and appropriate equipment for students to conduct the required experiments. This is a significant concern, as Earth Science is a laboratory-based science that relies heavily on hands-on activities to help students learn and understand the concepts. Without adequate laboratory equipment, students cannot fully participate in the learning process and may not develop a strong understanding of the Earth Sciences. This could have negative implications for their future academic and professional success. There are several reasons why a school might need more laboratory equipment in Earth Science. One possibility is that the school district needs to allocate more funding for science education. Another possibility is that the school's Earth Science program is relatively new and has yet to have time to accumulate a full range of equipment.

Similarly, the research study of Chakour et al. (2019) investigates the correlation between the availability of laboratory equipment and students' academic achievement in Earth Sciences. The authors suggest that a lack of sufficient laboratory resources poses a challenge for educators in delivering the necessary hands-on experiences to facilitate effective learning of Earth science among students.

Physics

The lack of laboratory equipment in Physics is a significant concern, with a mean score of 1.4, as it prevents students from engaging with hands-on learning activities essential for understanding and applying physics concepts. The curriculum guide for Grade 9 Science teachers includes a number of experiments that require specialized equipment, such as force meters, thermometers, and light microscopes. With this equipment, students can fully understand the concepts taught in class. The lack of laboratory equipment has also a negative impact on student motivation and engagement in Physics. Students are more likely to be interested in and learn from subjects that they can experience firsthand. When students are able to conduct experiments and see the results themselves, they develop a deeper understanding of the material.

Furthermore, the case study of Parno et al. (2020) investigated the influence of laboratory resources' availability and quality on student motivation and engagement in Physics. It revealed a positive correlation between the availability and quality of laboratory supplies and students' motivation to learn Physics and the level of engagement in classroom activities. Additionally, the findings revealed a positive correlation between the availability and quality of laboratory supplies and the extent to which students comprehended fundamental principles in Physics.

Extent of the utilization of the different laboratory equipment in terms of process skills

Observing

A mean score of 3.3 for the extent of utilization of different laboratory equipment in the observing skill indicates a moderate utilization. This means that there is room for improvement, as students could benefit from more opportunities to use laboratory equipment to develop their observing skills. Observing is a fundamental process skill in Science. It allows students to gather information about the world by using their senses. Observing is also essential for critical thinking and problem-solving, enabling students to identify patterns and trends from the data they collect. Teachers can use laboratory equipment to help students develop their observing skills in many different ways. Teachers can allow students use laboratory equipment to observe the physical properties of other objects, such as their color, shape, size, and texture. Teachers can also have students use laboratory equipment to observe chemical reactions, biological processes, and physical phenomena.

Moreover, the study of Pareek (2019) investigated the utilization of laboratory equipment by educators to develop students' observational skills. This study outlined a variety of laboratory exercises that can be utilized to enhance students' competence in accurate observation and detailed documentation of their results. The activities undertaken by students led to a significant enhancement of their observational abilities.

Classifying

A mean score of 3.7 for the extent of utilization of different laboratory equipment in terms of the classifying skill indicates a high extent of utilization. This is a positive finding, as classifying is a crucial process skill in Science. It allows students to group objects or events based on their similarities and differences. This can help students to better understand the world around them and to make predictions about future events. In addition, using laboratory equipment for classifying can help students develop other essential skills, such as problem-solving, critical thinking, and communication skills. When working on laboratory activities, students often have to solve problems, think critically about the data they are collecting, and communicate their findings to others.

The study of Pareek (2019) revealed that the presence and quality of laboratory resources have a notable influence on students' acquisition of knowledge in the field of science. It also showed a positive correlation between the availability and quality of laboratory resources and the development of a more profound comprehension of scientific principles and essential scientific process abilities, such as classification, among students. The activities performed by students led to the enhancement of their skills in classification.

Inferencing

A mean score of 3.3 for the utilization of different laboratory equipment in terms of the inferencing skill indicates a moderate utilization. The method of inferencing holds significant importance in the field of Science. This approach enables students to derive inferences regarding the surrounding world by integrating their observations and pre-existing knowledge. Inferencing substantially fosters students' critical thinking and problem-solving abilities, allowing them to generate predictions and explain causal relationships. Hence, teachers who use laboratory equipment to engage students in inquiry-based learning are more likely to help students develop their inferencing skills than teachers who use laboratory equipment to demonstrate scientific concepts.

In contrast, the study of Pareek (2019) suggests that utilizing laboratory equipment can facilitate the provision of experiential learning opportunities for students, hence enabling the cultivation of their science process skills. However, the activities carried out by the students yielded no discernible enhancement in their inferencing ability.

Predicting

The study found that the extent of utilization of different laboratory equipment in terms of the predicting skill has a moderate extent with a mean score of 3.0. This means laboratory equipment is used effectively to help students learn to predict. The laboratory equipment can allow students to conduct experiments and collect data which are essential for making predictions. Also, laboratory equipment can help students visualize and understand complex concepts. Lastly, laboratory equipment can allow students to work collaboratively and solve problems.

The study of Salanatin (2020) examines the significance of laboratory equipment in inquiry-based learning. The author claimed that utilizing laboratory equipment can facilitate the provision of experiential learning opportunities for students, fostering the development of their predictive skills.

Using laboratory equipment enables students to see and comprehend intricate subjects. The laboratory exercises the students performed showed a particular improvement in their ability to make predictions.

Experimenting

A mean score of 3.1 for the extent of utilization of laboratory equipment in terms of experimenting skill indicates a moderate utilization. There are several possible reasons for this moderate extent of utilization in experimenting, such as students' lack of access to laboratory equipment, some schools' limited funding for science education and need for help to purchase the latest and greatest gear. Additionally, some schools may need to get old equipment in better condition. Also, a moderate extent of utilization shows that students need to become more familiar with how to use all of the laboratory equipment that is available to them. Students may need training on how to use specific pieces of equipment safely and effectively.

According to Pareek (2019), the contributing factor to the limited utilization of experimentation among students is their limited access to laboratory equipment. The utilization of laboratory equipment is crucial in facilitating the execution of experiments and other practical exercises that are vital for comprehending scientific ideas. The study revealed that most educational institutions did not grant students direct access to the equipment, and many schools still needed to provide opportunities for students to carry out experiments independently.

General Questions

A mean score of 2.3 for the extent of utilization of different laboratory equipment in terms of general questions skill indicates a low extent of utilization. This is a concern, as laboratory equipment can be a valuable tool for helping students develop their general questioning skills. General questioning skills are essential for scientific inquiry. They allow students to ask questions that can help them better understand the world around them and identify problems they can investigate. General questioning skills also help students become more critical thinkers and problem solvers. There are several reasons why laboratory equipment may not be used to its full potential to help students develop their general questioning skills; teachers may need to become more familiar with how to use laboratory equipment in this way and some students may hesitate to ask questions or participate in laboratory activities.

The study by Pareek (2019) discovered that students with greater access to laboratory resources were able to develop their questioning abilities. The study also found that students with access to better laboratory resources were more likely to pose higher-order questions requiring critical thinking and problem-solving abilities. Similarly, teachers encounter problems with inadequate equipment, no assistance for setting up apparatus, and insufficient laboratory period duration when conducting the activities.

Performance level of the Grade 9 Science teachers in facilitating laboratory activities

Biology

The study results revealed that the performance level of Grade 9 Science teachers in facilitating laboratory activities in Biology is developed with a mean score of 4.2. This finding suggests that Grade 9 Science teachers exhibit a well-developed proficiency in guiding students through laboratory exercises in Biology. It implies that they possess the requisite subject matter expertise, pedagogical skills, and classroom management capabilities to create a conducive learning environment for hands-on scientific exploration within Biology. This outcome underscores the potential positive impact on students' educational experiences, as effective facilitation of laboratory activities can enrich their understanding, stimulate critical thinking, and foster a deeper engagement with the subject matter.

According to Shana and Abulibdeh (2020), acquiring subject matter knowledge is advantageous for educators in the field of education, as it enables them to effectively instruct pupils on many scientific subjects by actively involving them in the educational process. Also, the research revealed that the subject matter competence possessed by science teachers will make the students engage more often in laboratory activities and experiments. Moreover, laboratory experiments are crucial in studying scientific disciplines, including biology.

Chemistry

The results revealed that the performance level of Grade 9 Science teachers in facilitating laboratory activities in Chemistry is developed with a mean score of 4.6. This finding shows the competence and effectiveness of these teachers in creating a conducive learning environment for practical experimentation and hands-on learning experiences. It implies that these educators possess the necessary knowledge, skills, and pedagogical strategies to convey theoretical concepts effectively and translate them into practical applications, promoting a deeper understanding of Chemistry among their students. Such high-performance levels in laboratory facilitation indicate a commitment to quality science education, likely leading to enhanced student engagement, comprehension, and interest in the subject matter.

The research of Kiran and Boz (2020) examines the significance of pedagogical content knowledge (PCK) in facilitating effective instruction in chemistry. Pedagogical Content (PCK) refers to the specialized information chemistry teachers possess regarding the most effective methods for teaching chemistry ideas. The authors claim that pedagogical content knowledge (PCK) is crucial in facilitating proficient chemistry instruction, as it empowers educators to construct and execute laboratory exercises and experiments congruent with chemical principles. In addition, laboratory experiments play a vital role in investigating scientific fields, such as chemistry.

Earth Science

The study results revealed that grade 9 science teachers' performance level in facilitating Earth Science laboratory activities is developed with a mean score of 4.9. This finding means that the teachers have a good understanding of the concepts and skills involved in facilitating laboratory activities, and they can implement them effectively in the Earth Science subject. This is likely due to several factors, including their training and experience, their available resources, and their enthusiasm for science education. There are several benefits to having teachers skilled in facilitating laboratory activities. Laboratory activities can help students to develop their scientific knowledge and skills. By actively engaging in experiments and other laboratory activities, students can learn about the scientific process, develop their critical thinking skills, and gain a deeper understanding of scientific concepts.

Klippel et al. (2019) stated that educators specializing in earth science firmly comprehend the fundamental principles and competencies necessary for conducting laboratory exercises. Moreover, they exhibit a high level of proficiency in efficiently incorporating these activities within the context of the Earth Science curriculum. The study additionally illustrates the significance of incorporating laboratory and lecture components in introductory-level Earth science courses to optimize students' educational achievements.

Physics

The results revealed that the performance level of the Grade 9 Science teachers in facilitating laboratory activities in Physics is consolidated with a mean score of 6.5. This means that the teachers are generally proficient in promoting laboratory activities in Physics. Effective implementation of laboratory activities in Physics can be attributed to several critical factors, including teacher training and experience in facilitating such activities are crucial, ensuring they can guide students effectively. Also, access to sufficient resources and facilities is essential to support these activities adequately. In addition, teachers' motivation, positive attitude towards laboratory work, and belief in its educational significance play pivotal roles in promoting student engagement and learning. Lastly, practical classroom management skills are necessary to ensure students' safety and active participation in laboratory activities.

In their study, Shana and Abulibdeh (2020) evaluate the significance of teacher preparation and experience in facilitating proper physics laboratory instruction. The instructor demonstrates a high level of competence in promoting laboratory exercises for the field of physics. In addition, laboratory experiments play an important part in the study of scientific fields, such as physics.

Correlation between Levels of Adequacy and Performance Level

Level of adequacy of the laboratory equipment and performance level

There is a low positive correlation between the level of adequacy of laboratory equipment and the performance level of Grade 9 science teachers in Malapatan Districts 1, 2, and 3. While the correlation is not statistically significant at the 0.05 level, it is still noteworthy that there is a positive relationship between these two variables. This suggests that teachers with access to adequate laboratory equipment may perform at a higher level. Hence, teachers with access to adequate laboratory equipment are more likely to use it in their lessons. This could lead to students being more engaged in their learning and learning the concepts more deeply. Also, teachers with adequate laboratory equipment are more likely to feel confident in their teaching. This is because they know they have the resources to create effective and engaging learning experiences for their students. Finally, it is also possible that the correlation between laboratory equipment adequacy and teacher performance is due to other factors, such as the teacher's experience, training, and teaching philosophy.

According to Duban et al. (2019), using science laboratory equipment enables students to engage in experiential learning through the independent execution of diverse experiments. Students are required to utilize various models and comprehend diverse scientific theories and concepts. Additionally, to optimize the efficacy of the laboratory experiment, it is suggested by the authors that the school administration provide the essential equipment, glassware, and chemicals required to ease the experimental procedures for a wide range of scientific disciplines.

Extent of the utilization and performance level of the Grade 9 Science teachers

The study found a low negative correlation between the extent of utilization of laboratory equipment and the performance level of Grade 9 science teachers in Malapatan Districts 1, 2, and 3. This means that as the extent of utilization of laboratory equipment increases, the performance level of grade 9 science teachers tends to decrease. However, the correlation is not statistically significant. Moreover, teachers who are less experienced or less confident in their science knowledge may be more likely to rely on laboratory equipment to teach their lessons. This could lead to students not learning the concepts as deeply as they would if the teacher were using a more hands-on approach. Also, teachers under pressure to cover a lot of material may be more likely to skip or minimize laboratory activities. This is because laboratory activities can be time-consuming and require careful planning and preparation. Finally, it is also possible that the correlation between laboratory equipment utilization and teacher performance is due to other factors, such as the quality of the laboratory equipment, the availability of support staff, and the overall school culture.

The study of Branan et al. (2023) explained that the efficacy of science instruction and acquisition is contingent upon the utilization of direct observation, physical interaction, and manipulation of tangible natural entities and substances. The addition of knowledge by students within educational settings would be deemed satisfactory if they engage in active observation and comprehend the interplay between actions and their corresponding reactions. In addition, educational institutions must possess up-to-date scientific laboratory supplies and equipment to cultivate an engaging and efficacious learning environment for students, thereby fostering their active participation and substantial contributions to physics, biology, and chemistry.

Implication of Findings

Based on the results of the study, it can be implied that:

1. Teacher education programs must better equip future educators, especially those pursuing Master of Arts in Education degrees with Science specializations, to effectively harness laboratory resources through comprehensive training in equipment usage and inquiry-based activities. Additionally, targeted professional development is crucial, particularly for teachers with non-science backgrounds or fewer years of experience, aiming to enhance their capacity to plan and implement laboratory activities effectively. Addressing the need for more in-service training among teachers is essential; schools should allocate resources for training programs covering new technologies and teaching methods, empowering educators to maximize laboratory resources for student learning.
2. The inadequacy of laboratory equipment poses multiple challenges: it hinders teachers' ability to conduct hands-on experiments and practical demonstrations, impacting teaching performance and student learning outcomes. Additionally, it reduces student engagement in science lessons, potentially diminishing motivation and achievement. Moreover, this laboratory equipment inadequacy creates an inequitable learning environment, favoring students in schools with well-equipped laboratories and not favoring those in resource-limited institutions.
3. The extensive use of laboratory equipment in the Classifying aspect suggests a strong foundation in scientific inquiry, potentially reflecting effective teaching methods or resource allocation. Educators can capitalize on this achievement by incorporating more inquiry-based learning activities that necessitate student object and phenomenon classification. However, the limited utilization levels in Observing, Inferencing, Experimenting, Predicting, Communicating, and General Questions highlight areas needing enhancement. To address these shortcomings, educators can employ strategies promoting broader utilization of lab resources. Hence, teachers can create experiments requiring students to make meticulous observations, formulate hypotheses, test those hypotheses, and predict outcomes. Additionally, fostering an environment where students ask overarching questions about scientific concepts and employ laboratory equipment for exploration can be beneficial.
4. The importance of tailored professional development opportunities, such as workshops and online courses, plays a role in enhancing teachers' knowledge and teaching skills in these subjects. Additionally, ensuring access to high-quality teaching resources, including textbooks and laboratory equipment, is crucial. Encouraging collaboration among teachers to share best practices can foster a culture of continuous improvement. Regular monitoring of student performance in Earth Science,

Chemistry, and Biology will enable early identification of struggling students, enabling targeted support to ensure their success.
5. Factors like teacher training quality, student motivation, or school culture on teacher performance could influence the relationship. Consequently, school administrators and policymakers should not prioritize increasing laboratory equipment just to enhance teacher performance. Instead, a holistic approach should be adopted, including providing high-quality professional development for teachers, fostering a supportive school environment, and ensuring access to necessary teaching resources. Teachers, likewise, should diversify their teaching methods, focus on skill development, and tailor instruction to meet diverse student needs rather than relying solely on laboratory equipment for improvement.

Conclusions

Based on the findings of the study, the researcher concludes that:

1. There are five (5) teachers out of thirteen (13) who are Master of Arts in Education major in Science, seven (7) out of thirteen (13) who have rendered 1-5 years in the teaching of science and eleven (11) who do not have in-service training .
2. The Biology and Chemistry have inadequate laboratory equipment while Earth Science and Physics laboratory equipment are unavailable.
3. Classifying skill has high extent of utilization, whereas the Observing, Inferencing, Predicting, Experimenting and Communicating skills have moderately extent of utilization while the General question has low extent of utilization.
4. The Biology, Chemistry and Earth Science are on developing performance level while Physics is in consolidating performance level.
5. The level of adequacy of the laboratory equipment and performance of Grade 9 Science teachers as well as the extent of utilization and the performance level is not significant.
6. The professional training program for science teachers on maximizing and enhancing the utilization of laboratory equipment using the different science process skills (see Appendix O) is developed to help enhance the teachers' knowledge and teaching skills in science.

Recommendations

Based on the findings of the study, the researcher recommends the following:

1. The municipality of Malapatan, in partnership with authorities and stakeholders, should consider provisions of continuous professional development to support early-career teachers, and the provision of adequate training opportunities to improve the quality of science education in the districts of Malapatan.
2. Educational institutions shall procure laboratory equipment for Biology, Chemistry, Earth Science, and Physics to support Grade 9 Science teachers in conducting essential hands-on experiments and practical demonstrations. Also, they shall prioritize equipment purchases based on the input of teachers and students, considering curriculum requirements, available resources, and the diverse needs of students, and establish a maintenance system to ensure the long-term usability of the equipment.
3. The need for strategic resource allocation and support from educational authorities and stakeholders must be taken into consideration. This includes advocating for an increase of funding to improve la-

boratory infrastructure, establishing efficient procurement systems, and providing regular maintenance and repair services for existing equipment. Additionally, collaboration with external organizations, community engagement, and leveraging partnerships can help secure additional resources and support for enhancing laboratory facilities in secondary schools.

4. Further study can be conducted including the performance level of the students in the areas of biology, chemistry, earth science and physics in relation to the different process skills namely: observing, classifying, inferencing, predicting, experimenting and communicating.
5. Future researchers may explore the contextual factors influencing the effect of adequacy of laboratory equipment on science teaching to help further improve this study.

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