

**INVESTIGATING THE EFFECTIVENESS OF LOCALIZED CONTEXT-BASED
STEM APPROACH USING 5E LESSON PLAN
IN TEACHING SCIENCE 3**

**ZUHARA M. TAMPOGAO
NAMILA L. MACAGAAN**

**SUBMITTED TO THE FACULTY OF THE COLLEGE OF EDUCATION
MINDANAO STATE UNIVERSITY – SULTAN NAGA DIMAPORO
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE
DEGREE**

BACHELOR OF ELEMENTARY EDUCATION

JULY 2026

BIOGRAPHICAL SKETCHES

The first researcher was born on May 23, 2004, in Port Area, Manila, and is presently residing in Barangay Poblacion, Sultan Naga Dimaporo, Lanao del Norte. The eldest of five children of Mr. Samer A. Tampogao and Mrs. Normina M. Tampogao. She completed her elementary, junior, and senior high school education at Sultan Naga Dimaporo Memorial Integrated School (SNDMIS) in April 2016, April 2020, and 2022, respectively. She is presently pursuing the degree in Bachelor of Elementary Education major in General Education at Mindanao State University – Sultan Naga Dimaporo (MSU-SND).

ZUHARA MARUHOM TAMPOGAO

The second researcher was born in Bauyan, Sultan Naga Dimaporo, Lanao del Norte, on July 17, 2000, and is currently residing in Brgy. Bauyan, Sultan Naga Dimaporo, Lanao del Norte. The eldest daughter of Mr. Abdul Awwal S. Macagaan and Mrs. Aisah A. Lumna. She has two brothers and one sister. She graduated from Sultan Ali Dimaporo Memorial Integrated School (SADMIS) for her elementary, junior, and senior high school education in 2014, 2019, and 2021. She is currently pursuing the degree in Bachelor of Elementary Education major in General Education at Mindanao State University – Sultan Naga Dimaporo (MSU-SND).

NAMILA LUMNA MACAGAAN

ACKNOWLEDGMENTS

The researchers offer their utmost praises and thanks to Almighty **Allah (S.W.T)** for His endless blessings, guidance, knowledge, and strength, which allowed them to successfully complete this study despite the challenges they encountered.

The researchers extend their heartfelt gratitude to their thesis adviser, **Asst. Prof. Settie-Zhymah S. Padate** for her insightful guidance, motivation, invaluable recommendations, and unwavering support throughout the course of this research. It was truly a privilege and an honor to be guided by her.

Special thanks are also extended to their panel members, **Asst. Prof. Lielzel P. Naquines** and **Asst. Prof. Najeb B. Aloyod**, for generously sharing their time, knowledge, and valuable feedback, which greatly contributed to the improvement and finalization of this study.

The researchers sincerely thank the respondents, the **Grade 3 – Plato** pupils of Sultan Naga Dimaporo Memorial Integrated School (SNDMIS), for their active participation and cooperation, which were essential to the success of this research. They also extend their gratitude to their cooperating teacher, **Mrs. Junaida O. Dimaporo**, for her support and assistance in facilitating the conduct of this study, and to **Dr. Indihra B. Dimaporo Tawantawan** for her everlasting support to the College of Education.

On a more personal note, the first researcher extends her heartfelt appreciation to her beloved parents, **Mr. Samer A. Tampogao** and **Mrs. Normina M. Tampogao**, for their unwavering love, trust, and support. She likewise acknowledges her siblings for their constant emotional support, which provided her with motivation and inspiration. Special thanks are also extended to her beloved aunt, **Ms. Aida M. Maruhom**, for her invaluable encouragement and financial assistance, both of which greatly contributed to the completion of her undergraduate studies.

The second researcher also expresses her sincere gratitude to her beloved parents, **Mr. Abdul Awwal S. Macagaan** and **Mrs. Aisah A. Lumna**, for their unwavering love, faith, and support, as well as to her siblings, **Mr. Musa-ab L. Macagaan**, **Mr. Sohaib L. Macagaan**, and **Ms. Naila L. Macagaan**, for their patience, care, support, and encouragement. Indeed, they are a blessing from Almighty Allah.

TABLE OF CONTENTS

	PAGE
Title Page.....	i
Certificate of Approval.....	ii
Biographical Sketch.....	iii
Acknowledgments	iv
Table of Contents.....	v
List of Figures.....	vii
List of Tables.....	viii
List of Appendices.....	ix
Abstract.....	x
CHAPTER 1. INTRODUCTION	1
1.1 Statement of the Problem.....	3
1.2 Hypothesis.....	4
1.3 Objectives of the Study.....	4
1.4 Theoretical Framework.....	5
1.5 Conceptual Framework.....	9
1.6 Scope and Limitations of the Study.....	10
1.7 Significance of the Study.....	11
1.8 Definition of Terms.....	12
CHAPTER 2. REVIEW OF RELATED LITERATURE	15
2.1 The Impact of the 5E Learning Cycle Model Based on the STEM Approach on Scientific Attitudes Science Learning Outcomes.....	15
2.2 Localized Context-Based STEM Education Learning Activities.....	19
2.3 Improved Conceptual Understanding in Learning Biology Through Localized and Contextualized Learning Activities.....	23
2.4 Effectiveness of Contextualization and Localization in Teaching.....	26
CHAPTER 3. MATERIALS AND METHODS	28
3.1 Research Design.....	28
3.2 Research Environment.....	29
3.3 Respondents of the Study and Sampling Technique.....	30

3.4 Research Instruments.....	30
3.5 Data Gathering	33
3.6 Data Analysis.....	36
CHAPTER 4. RESULTS AND DISCUSSION	40
4.1 Demographic Profile of the Respondents.....	40
4.1.1 Age.....	40
4.1.2 Gender.....	41
4.2 Pre-test and Post-test Score Results of the Respondents.....	43
4.3 Difference between the Pretest and Posttest Result of the Respondents.....	47
4.4 Integration of the 5E Lesson Plan in the Localized Context-Based STEM Approach.....	48
4.5 Evaluation Result of the Water Filter Prototype.....	54
4.6 Respondents' Level of Engagement Based on the Survey Questionnaire.....	59
CHAPTER 5. CONCLUSION AND RECOMMENDATIONS	63
5.1 Conclusion.....	63
5.2 Recommendations.....	65
REFERENCES	67
APPENDICES	76

LIST OF FIGURES

FIGURE	TITLE	PAGE
1.1	The Schematic Diagram of the Conceptual Framework of the Study	10
3.1	Geographical Location of Sultan Naga Dimaporo Memorial Integrated School	29
3.2	Flowchart of the Data Gathering Procedures	35
4.1	Line Graph on the Respondents' Pretest and Posttest Results	46
4.2	Engagement Stage	49
4.3	Exploration Stage	50
4.4	Explanation Stage	52
4.5	Elaboration Stage	53
4.6	Evaluation Stage	54
4.7	Water Filter Prototype of the Group 1	57
4.8	Water Filter Prototype of the Group 2	58

LIST OF TABLES

TABLE	TITLE	PAGE
4.1.1	Frequency and Percentage Distribution of the Respondents' Age (n=34).....	41
4.1.2	Frequency and Percentage Distribution of Respondents' Gender (n=34).....	43
4.2	Pre-test and Post-test Score Results of the Respondents (n=34).....	45
4.3	Difference Between the Pretest and Posttest Result of the Respondents (n=34).....	48
4.4	Evaluation Result of the Water Filter Prototype.....	56
4.5	Respondents' Level of Engagement Based on the Survey Questionnaire (n=34).....	61

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Ethical Clearance Certificate	76
B	Permission Letter to the School Principal	77
C	Permission Letter to the Class Adviser	78
D	Permission Letter to the Respondents	79
E	Test Questionnaire for Pre-test	80
F	Detailed Lesson Plan	84
G	Test Questionnaire for Post-test	104
H	Survey Questionnaire	108
I	Answer Key	110
J	Table of Specification (TOS)	111
K	Documentation	112

ABSTRACT

ZUHARA M. TAMPOGAO and **NAMILA L. MACAGAAN** Mindanao State University – Sultan Naga Dimaporo. July 2026. **INVESTIGATING THE EFFECTIVENESS OF LOCALIZED CONTEXT-BASED STEM APPROACH USING 5E LESSON PLAN IN TEACHING SCIENCE 3.**

Thesis Adviser: Asst. Prof. Settie-Zhymah S. Padate

This study employed an experimental research design, specifically the one-group pre-test and post-test design, to investigate the effectiveness of the 5E Lesson Plan integrated within a localized context-based STEM approach in improving the conceptual understanding and engagement of the Grade 3 – Plato pupils of Sultan Naga Dimaporo Memorial Integrated School (SNDMIS). The respondents of the study were 34 pupils from Section B, officially enrolled during the Academic Year 2025–2026. A 20-item multiple-choice pretest and posttest aligned with the Science 3 curriculum, together with an engagement survey, were administered before and after the intervention to measure pupils' learning and participation. Data were analyzed using frequency and percentage distribution, weighted mean, Wilcoxon signed-rank test. Results revealed that pretest scores were relatively low, with only a few pupils demonstrating higher achievement, while posttest results showed a remarkable improvement, with most respondents shifting to the “Very Highly Achieved” category. The Wilcoxon signed-rank test confirmed a significant difference between pretest and posttest scores ($p = 0.001$), indicating that the intervention was effective. Furthermore, survey findings showed that learners were highly engaged during the lessons, enjoying the use of local materials, hands-on group activities, and inquiry-based tasks. The study concludes that integrating the 5E instructional model with localized, context-based STEM instruction significantly enhances pupils' conceptual understanding, engagement, and problem-solving skills in Science lessons.

Keywords: 5E Lesson Plan, Localized Context-Based STEM, Conceptual Understanding, Science

CHAPTER 1

INTRODUCTION

Innovative learning strategies have been incorporated into educational procedures more and more in recent years to satisfy the changing needs of the twenty-first century. STEM education, which combines Science, Technology, Engineering, and Mathematics to promote experiential learning, is one notable innovation. To improve pupils' critical thinking, creativity, and teamwork abilities, STEM education places a strong emphasis on learning through practical experiences and problem-solving exercises (Han, Kelley, and Knowles, 2021). Students are supposed to solve practical issues, come up with original ideas, and take part in worthwhile educational activities as a result of this integration. In addition to developing critical academic competencies, STEM education's growing significance as a transformative learning approach gives pupils the tools they need to succeed in the twenty-first century.

Kolb (2014) stated that learning is a process based on concrete experiences resulting from one's interactions with their environment. According to the experiential learning theory put forward by Kolb, individuals use the information obtained from their experiences to solve their daily life problems. According to this theory, individuals learn by including multiple perspectives using their imagination.

The foundation of STEM education is developing learning spaces that provide people with tangible experiences. In STEM activities, people also apply their prior knowledge to solve problems from various disciplines. Thus, experiential learning theory serves as the philosophical cornerstone of this investigation.

Teachers should favor learning models that allow students to gain experience in STEM subjects in order to implement STEM education effectively. Critical thinking abilities can be developed using the 5E learning cycle model. Research by Kuba et al. (2020) supports this claim by showing that pupils' critical thinking abilities are significantly impacted by the 5E learning cycle model.

Consequently, there are five stages in Bybee's (1997) 5E learning cycle model. These phases are as follows: *Engagement*, where students are drawn to the lesson; *Exploration*, where they conduct exploration and make predictions through a variety of activities and experiments; *Explanation*, where they define and clarify the subject's concepts by fostering an environment of discussion in class; *Elaboration*, where they can apply what they have learned thus far to other areas; and *Evaluation*, where the process and the students are assessed.

Additionally, a common tool for teaching concepts and dispelling misconceptions is the 5E learning cycle model. Research indicated that the 5E learning cycle model helps students succeed by giving them the opportunity to learn in a meaningful way. For example, a study conducted in 2024 by Melgarejo et al.

investigated how the 5E instructional model affected meaningful learning in Science and technology. The findings showed that by involving pupils in activities that encourage critical thinking and the application of knowledge in practical settings, the model successfully supported meaningful learning.

In light of this, the purpose of this study is to examine how well the 5E lesson plan can be incorporated into the Localized Context-Based STEM Approach for teaching Science to elementary school pupils. Its specific goal is to investigate how well it enhances pupils' conceptual understanding of Science concepts and engagement level in grade 3 Science.

1.1 Statement of the Problem

This study aimed to investigate the effectiveness of the integration of 5E lesson plan within the Localized Context-Based STEM Approach in Teaching Grade 3 Science at Sultan Naga Dimaporo Memorial Integrated School. Specifically, it aimed to analyze its effectiveness in promoting pupils' conceptual understanding and engagement level in Science 3.

This study sought to answer the following:

1. What is the profile of the respondents in terms of:
 - 1.1 age; and
 - 1.2 gender?

2. What are the pupils' pretest scores before the 5E in the localized context-based STEM approach?

3. What are the pupils' posttest scores after the 5E in the localized context-based STEM approach?

4. Is there a significant difference between the pretest and posttest scores using 5E in the localized context-based STEM approach of the respondents?

5. What is the level of engagement of the respondents?

1.2 Null Hypothesis

H_0 . There is no significant difference between the pretest and posttest scores of using the 5E in the localized context-based STEM approach of the respondents.

1.3 Objectives of the Study

This study aimed to investigate the effectiveness of 5E Lesson Plan within a Localized Context-Based STEM Approach in teaching Science Grade 3 pupils.

Specifically, it sought to:

1. determine the profile of the participants in terms of age and gender.
2. evaluate the pupils' pretest scores before the 5E in the localized context-based STEM approach;
3. evaluate the pupils' posttest scores after the 5E in the localized context-based STEM approach

4. compare the pretest and posttest scores to determine if there is significant difference between the pretest and posttest scores of the pupils taught using the 5E in localized context-based STEM approach of the respondents; and

5. determine the level of engagement of pupils after being taught using the 5E lesson plan integrated within a localized, context-based STEM approach in Science.

1.4 Theoretical Framework

To support this study, the researchers used the following theories, as mentioned below. The effectiveness of integrating 5E lesson plan within a Localized Context-Based STEM approach in teaching Science among grade 3 pupils can be understood through the **Constructivist Theory (CT)**, **Experiential Learning Theory (ELT)**, and **Inquiry-Based Learning (IBL)**.

Constructivism Theory (Piaget, 1952; Vygotsky, 1978) posits that individuals actively construct their own knowledge and understanding through experience and social interaction, rather than passively receiving information. Constructivism transforms the learner from a passive recipient of information to an active participant in the learning process. According to Piaget (1972) and Vygotsky (1978), psychological constructivism views learning as an active process in which learners construct meaning individually through experiences, while teachers serve as facilitators who guide the learning process. These are designed situations that

intrigue motivation among the pupils, enabling them to be exposed to dissonance and create proper tasks, and teachers as facilitators of learning are tasked to tailor the pupils' proficient sides to encourage and establish their autonomy and self-construction through tasks, activities, and projects. It can be done through various life-thought simulating activities, ranging from direct learning to learning by doing.

Constructivism in a class that utilizes the 5E lesson within a Localized, Context-Based STEM Approach ensures that students actively construct their learning through exploration, reflection, and application in real-world contexts. This process promotes deeper engagement, critical thinking, and the ability to apply knowledge in a meaningful way, all of which are central to both constructivist theory and effective STEM education.

Consequently, another theory that supports this study is **the Experiential Learning Theory** (Kolb, 2014). Experiential learning is a pedagogical approach that begins by immersing pupils in open-ended activities and concrete real-life situations. Through intentional observation of and reflection on those experiences, students cultivate new awareness and new knowledge. Experiential learning describes the ideal process of learning, invites you to understand yourself as a learner, and empowers you to take charge of your own learning and development.

The way you learn is the way you approach life in general. It is also the way you solve problems, make decisions, work on teams, and meet life's challenges. In essence, integrating Experiential Learning Theory (ELT) in teaching Science using

the 5E learning model within a Localized Context-Based STEM Approach offers a dynamic, hands-on learning experience that significantly enhances pupils' conceptual understanding. Kolb's theory, which revolves around four key stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation, provides a robust framework for learning by doing, reflection, and application. Overall, this approach, when combined with the 5E model, allows pupils to explore Science concepts through real-world, relevant experiences, promoting deeper engagement and understanding.

Subsequently, another theory that supports this study is the **Inquiry-Based Learning (IBL)**. Based on John Dewey's philosophy that education begins with the curiosity of the learner, inquiry in the classroom places the responsibility for learning on the pupils and encourages them to arrive at an understanding of concepts by themselves. Lee et al. (2004) defined inquiry-based learning as an "array of classroom practices that promote student learning through guided and, increasingly, independent investigation of complex questions and problems, often for which there is no single answer". It originates from constructivist learning theory, which suggests that learning occurs when learners actively construct their knowledge by interacting with the world. This theory assumes that the best way to learn is by asking questions, thinking critically, and solving problems in a student-centered way.

Inquiry-Based Learning Approach puts a premium on questioning, investigating, proving, probing, explaining, predicting, and establishing connections of evidence (Colburn, 2020). Instead of a transmissive mode of teaching, this approach involves inquiry and sustained active engagement of learners. The approach is characterized in the classroom by questions and discussions. Inquiry allows learners to formulate questions and find solutions through learning real-life-based investigations and research projects. Concepts and specific scientific terms need to be explained in simple language. Applications and situations need to be explained in relevant contexts and are best explored through Science activities. In this approach, learners also engage in developing process skills, analyzing and evaluating evidence, experiencing and discussing, and talking to their peers about their own understanding (Suchman, 1964). Learners collaborate with others to make discoveries, solve problems, and plan investigations.

Inquiry-based learning is all about learners taking the lead in exploring real-world questions, solving problems, and seeking answers through active investigation. Constructivism, which asserts that knowledge is built through personal experience and reflection, fuels this approach by encouraging learners to engage directly with the world around them and construct their own understanding.

In essence, the lesson, powered by inquiry-based learning, creates a bold, dynamic classroom environment where students are not just learning facts—they are actively constructing knowledge through exploration, critical thinking, and real-

world application. This approach fosters deeper engagement, problem-solving skills, and collaboration, ensuring that students develop not just academic knowledge but the ability to apply that knowledge to make meaningful contributions to their communities.

Inquiry-based learning thrives in a localized context-based STEM approach by making learning relevant and empowering learners to address real community issues through STEM. The 5E model provides a structured, supportive framework that guides learners through inquiry stages-from engagement to evaluation-ensuring deep understanding and meaningful application.

1.5 Conceptual Framework

Figure 1.1 presents the schematic diagram that provides information about the flow of this study. This study used the Input-Process-Output (IPO) model. The input consists of a pre-test, aimed at assessing pupils' prior knowledge before the intervention. The process involved implementing the 5E lesson plan in a Localized Context-Based STEM Approach as the intervention. The output includes a post-test, which was administered to measure the pupils' progress after the intervention.

Additionally, a survey questionnaire was also administered after the intervention to determine pupils' engagement levels when taught using the 5E Lesson Plan within the Localized Context-Based STEM Approach. The presented

schematic diagram leads to collecting the data that are necessary for the results of the study.

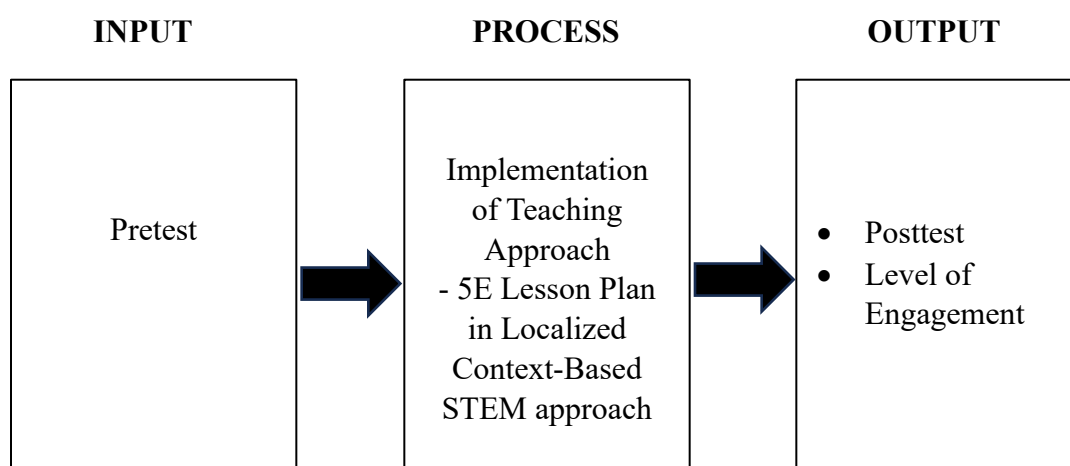


Figure 1.1 The Schematic Diagram of the Conceptual Framework of the Study.

1.6 Scope and Limitations of the Study

This study focused on investigating the effectiveness of the 5E Lesson Plan within a Localized Context-Based STEM Approach in teaching Grade 3 Science at Sultan Naga Dimaporo Memorial Integrated School during the academic year 2025–2026. Specifically, the lesson is about the Basic Needs of Living Things, i.e., Humans (air, water, food, and shelter).

The study also focused on how the integration of the 5E instructional model enhances pupils' conceptual understanding of Science concepts and engagement level during Science lessons when applied within a localized context-based STEM approach. The respondents of the study are Grade 3 pupils officially enrolled in the said school. The researchers assessed pupils' learning before and after the implementation of the 5E-based localized context-based STEM approach using pretest and posttest questionnaires and a lesson plan.

Additionally, a survey questionnaire was also administered to determine the respondents' level of engagement during the implementation. Furthermore, this study is limited to the week 6 lesson as specified in the K to 12 Curriculum Guide under the code S3LT-III-j14. Therefore, the findings may not apply to other topics or subject areas.

1.7 Significance of the Study

This study aimed to contribute to the improvement of Science education. The findings are beneficial to the following:

Pupils. This study can help pupils develop a deeper understanding of scientific concepts by relating them to real-life, local contexts. It can also promote critical thinking, problem-solving, and appreciation for Science through interactive and meaningful learning experiences.

Teachers. The study could provide insights into the effectiveness of integrating the 5E Lesson Plan with localized STEM instruction, guiding teachers in designing lessons that are both engaging and contextually relevant to their pupils' environment.

School Administrators. By identifying effective teaching strategies, this study could support school leaders in making informed decisions regarding curriculum development, teacher training, and resource allocation to enhance Science instruction.

Parents/Guardians. The research highlights the impact of localized and inquiry-based learning on pupils' Science performance, encouraging parents to support science-related activities and experiential learning at home.

Future Researchers. This study can serve as a reference for future investigations on innovative teaching approaches in Science education, particularly in integrating localized contexts into STEM instruction for elementary students.

1.8 Definition of Terms

The researchers defined the following terms for easier understanding of the concepts of this study.

5E Localized Context-Based STEM Lesson Exemplar. A teaching guide that explicitly connects the 5E learning cycle model with the Engineering Design Process and integrated STEM units (Texas Education Agency, 2020).

In this study, the 5E Localized Context-Based STEM Lesson Exemplar is the prepared teaching guide that follows the 5E's instructional model (Engage, Explore, Explain, Elaborate, and Evaluate), where Science, Technology, Engineering, and Mathematics concepts are integrated across the phases. It is then applied to the participants, and its effectiveness was tested by a posttest.

Localized Context-Based. An educational approach that incorporates local culture, environment, and community issues into the curriculum to make learning more relevant and meaningful to learners (Psych Educ, 2023).

In this study, Localized Context-Based refers to adapting STEM lessons to reflect the local context, thereby making Science 3 more relevant to the pupils' everyday experiences.

STEM Education. It provides an innovative teaching approach which allows learners to use knowledge of 4 disciplines (Science, Technology, Engineering, and Mathematics) and make the learning process long-lasting and meaningful (Dianal, Turmudi, and Yohannes, 2021)

In this study, STEM Education refers to the integrated teaching of these four disciplines to enhance pupils' problem-solving skills and prepare them for future technological challenges. STEM education was integrated into the 5E lesson plan in Science 3 and its effectiveness was tested through a pretest and posttest.

Conceptual Understanding. The term conceptual understanding refers to pupils' ability to connect ideas, transfer knowledge, and deeply understand content

through instruction that emphasizes big ideas rather than isolated facts (Maine Department of Education, 2021).

In this study, the term conceptual understanding refers to the depth of pupils' comprehension of fundamental scientific concepts and principles as fostered through the implementation of a localized context-based STEM approach using the 5E lesson plan in Science 3. This approach situates learning within learners' local environments and real-world experiences, making Science more relevant and meaningful. Learners' conceptual understanding was tested based on their pretest and posttest scores.

Pretest. A preliminary test is administered at the beginning of an instructional period to evaluate pupils' prior knowledge, skills, and understanding of the subject matter (Proctor Edu, n.d., 2025).

In this study, the pretest refers to the evaluation conducted before implementing the 5E Lesson Plan and Localized Context-Based STEM Approach to determine learners' baseline understanding of Science 3 concepts.

Posttest. A test given after a lesson or a period of instruction to determine what the learners have learned (The Free Dictionary, n.d.; Psychology Dictionary, n.d., 2025).

In this study, the posttest is used to assess the effectiveness of the 5E Lesson Plan and the Localized Context-Based STEM Approach in improving pupils' understanding of Science 3 topics.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 The Impact of the 5E Learning Cycle Model Based on the STEM Approach on Scientific Attitudes and Science Learning Outcomes

Education has long been recognised as a fundamental instrument for developing individuals' potential and abilities. The enhancement of nations' educational quality has been deemed essential in fostering competitiveness on a global scale (Harianti et al., 2020)

According to Harianti et al. (2020), education has necessitated sustained attention and continuous reforms. One of the instructional methods that prepared pupils for global competition and enhanced their intellectual abilities was meaningful learning.

Furthermore, Acesta (2020) referenced that the rapid advancement of Science and technology significantly influenced pupils' educational development, particularly in Science education. According to Anif et al. (2020) and Setiawan et al. (2017), Science skills are not merely the mastery of facts, concepts, or principles but also involve a discovery process that allows learners to gain hands-on experiences and develop competencies in exploring and understanding their natural surroundings scientifically.

Given its importance in everyday life and the growing field of technology, Science education in elementary schools needs to be prioritized. However, many pupils still exhibited low learning outcomes. Moreover, Dewi and Dantes et. al. (2013), and Fitriyanti et al. (2020) referenced that pupils' low scientific attitudes remained a significant issue in Indonesian education. To counter this, fostering a scientific attitude is essential to minimise negative behaviours and facilitate knowledge development.

These challenges indicated that Science learning in elementary schools had not been optimised. A proposed solution to address these issues is the application of the 5E learning cycle model based on the STEM approach, which aims to enhance pupils' scientific attitudes and learning outcomes.

In support of this, Putra et al. (2020) implemented the 5E learning cycle strategy to enhance pupils' conceptual understanding and learning motivation in physics. The study found that the model encouraged learners to actively explore topics through various stages, leading to improved critical thinking skills and a deeper grasp of the subject matter.

Beyond the use of a learning model, an effective teaching and learning approach is also essential to foster scientific attitudes and improve pupils' science learning outcomes. One such approach is STEM education, which integrates Science, Technology, Engineering, and Mathematics as an interdisciplinary

framework for developing 21st-century skills (Nguyen et al., 2020; Kelley & Knowles, 2016).

Successful STEM activities start with offering knowledge to learners through an inquiry-based process, allowing them to construct their own knowledge. As stated by Agustina et al. (2020) and Conradt and Bogner (2018), STEM education supports knowledge development, encourages inquiry-based learning, and enables pupils to generate new knowledge through investigation. The STEM approach to education facilitates the integration of its core disciplines, such as Science, Technology, Engineering, and Mathematics, thereby enhancing interdisciplinary connections.

This approach extends beyond the development of cognitive abilities, requiring pupils to cultivate additional competencies, including problem-solving, creativity, collaboration, and adaptability, which are essential for professional success (Beswick and Fraser, 2019). These competencies are effectively developed when students engage in learning as problem-solvers, innovators, and creators (Nurjanah, 2020).

Recent studies indicate that STEM-based teaching strategies contribute to a more effective and engaging learning environment, as supported by the findings of the research of Astawan et al. (2022). In addition, the learning cycle model—a student-centred instructional method—encourages active learner participation and has been shown to enhance conceptual understanding.

The integration of the STEM-based 5E Learning Cycle Model presents an opportunity to cultivate essential 21st-century skills, particularly critical thinking. The integration of the STEM approach with the 5E Learning Cycle Model aligns with localized, context-based learning strategies that emphasize real-world applications and cultural relevance. Localized learning frameworks are designed to bridge theoretical concepts with pupils' immediate environments, thereby enhancing comprehension and engagement.

Recent studies have shown that context-based learning, which connects scientific concepts to learners' real-life experiences and familiar situations, enhances students' conceptual understanding, retention of knowledge, and problem-solving skills in Science education (Deveci & Karteri, 2020; Pozas et al., 2020).

Research has shown that integrating contextualized and localized approaches within STEM education enables learners to connect abstract scientific concepts with real-life experiences, thereby promoting deeper understanding and meaningful learning (Nguyen et al., 2020; Eroğlu & Bektaş, 2022). And this approach is further strengthened with the integration of the 5E Learning Cycle Model, which provides a structured, inquiry-driven model that encourages pupils to engage with concepts experientially.

Studies have shown that contextualized STEM education enhances learners' scientific literacy, problem-solving abilities, and interest in STEM-related careers

by connecting learning experiences to real-life situations and local contexts (Kelley & Knowles, 2016; Margot & Kettler, 2019).

However, despite the growing recognition of STEM-based, contextually relevant instruction, there remains a paucity of research investigating the application of the 5E Learning Cycle Model in the context of fostering scientific attitudes and improving Science learning outcomes.

This study seeks to address this gap by investigating the effectiveness of the 5E Learning Cycle within a localized, STEM-based framework, emphasizing its potential to cultivate critical thinking, inquiry-based learning, and real-world problem-solving skills.

2.2 Localized Context-Based STEM Education Learning Activities

As countries strive to maintain their global competitiveness in the 21st century, the need for a dynamic and innovative STEM workforce continues to rise. Central to this effort is enhancing both the quality and quantity of STEM educators, who are instrumental in preparing learners for a knowledge-based economy (Nguyen, 2024). Teachers involved in current educational reforms must demonstrate strong STEM competencies to effectively respond to shifting pupils' needs and equip them with the skills to tackle complex, real-world problems (Ardianti et al., 2020; U.S. Bureau of Labor Statistics, 2020).

One of the primary challenges of STEM education is equipping pupils with foundational knowledge and interdisciplinary problem-solving skills that enable them to address real-world issues (Kartal and Tasdimer, 2021). The integration of STEM education promotes the development of critical thinking and problem-solving skills, which are vital competencies in navigating the demands of the digital era (Lin and Chang, 2020; Astawan et al., 2022).

Integrating STEM education within a localized, context-based framework enhances its effectiveness by connecting scientific and mathematical concepts to learners' local environments, cultures, and lived experiences. Unlike traditional instruction, which often presents STEM concepts in abstract terms, this approach makes learning more meaningful by embedding real-world, culturally relevant contexts. Research indicates that when pupils see STEM concepts applied to their daily lives and communities, they are more engaged, motivated, and persistent in learning (Tytler et al., 2021; Johnson and Elliott, 2020). This method is particularly effective in supporting underrepresented groups in STEM by making the content more accessible and relevant (Tytler et al., 2021; Johnson and Elliott, 2020).

Further studies on student learning suggest the necessity for students to perceive the broad applicability of ideas across various real-world contexts to achieve meaningful understanding. Findings from research on learning and motivation have led many scholars to emphasise the importance of situated cognition and authentic contexts to promote learning (Cakmakci et al., 2020).

Additionally, some researchers advocate for incorporating real-life issues into the curriculum to develop pupils' conceptual understandings, placing these issues at the centre of the curriculum and emphasising knowledge about the interaction of Science, technology, and society as the primary content in Science instruction (Tytler et al., 2021).

The 5E model, which was developed based on the Science inquiry approach by the Biological Sciences Curriculum Study (BSCS) in 1987, is the most widely used in the long-term process (Bybee, 1997) in both the inquiry approach and STEM education. Since its development, a huge body of empirical studies on the 5E model has revealed the positive effects of the 5E model on the learning outcomes from conceptual change to higher-order thinking levels (Bybee et al., 2006).

The 5E model perfectly aligns with the Localized Context-Based STEM approach as both emphasize student-centred learning, real-world applications, and inquiry-driven instruction. By integrating the 5E Learning Cycle Model within a Localized Context-Based learning, learning becomes more relevant, fostering deeper conceptual understanding and engagement among learners.

The 5E model consists of five stages (phases): Engage, Explore, Explain, Elaborate, and Evaluate. This model provides a structured framework that aligns well with the Localized Context-Based STEM approach to enhance conceptual understanding in young learners. This growing body of research suggests that embedding STEM education within localized, inquiry-driven, and context-based

approaches not only deepens conceptual understanding but also supports equity by connecting Science learning with the diverse experiences of learners.

By integrating the 5E Learning Cycle Model in a Localized Context-Based approach, educators can create meaningful, student-centered experiences that enhance comprehension, problem-solving abilities, and critical thinking. Although challenges such as resource limitations and teacher training persist, addressing these barriers will be crucial to maximising the effectiveness of Localized Context-Based STEM education, as research shows that teacher self-efficacy is strongly linked to successful STEM implementation in classrooms (DeCoito & Myszkal, 2018).

Although socio-cultural elements such as family, community, and culture have been recognised as important in influencing pupils' cognitive development and engagement in recent studies (Bruce et al., 2025), the majority of research to date has focused on general educational contexts. Little research has been done on the specific interactions between these socio-cultural factors and instructional models like the 5E model (Engage, Explore, Explain, Elaborate, Evaluate) when used in a localized, context-based STEM framework, especially in early science education like Science 3.

Furthermore, few empirical studies examine how the 5E approach performs when rooted in learners' immediate social and cultural environment, even though contextualization and cultural alignment in education have been demonstrated to

improve retention and learner motivation. Most of the literature either concentrates on science education at a higher level or does not integrate structured pedagogical models like 5E with localized instruction.

Therefore, by examining the efficacy of the 5E model in a localized context-based STEM approach that is customised to the Science 3 curriculum, this study fills a glaring gap. It seeks to ascertain whether incorporating regional cultural and environmental components into the 5E framework improves elementary learners' comprehension, involvement, and application of scientific ideas.

2.3 Improved Conceptual Understanding in Learning Biology Through Localized and Contextualized Learning Activities

One teaching strategy that links classroom material to a student's personal life, culture, and community is called localized context-based learning. This method helps learners comprehend and retain what they learn by making lessons more meaningful and relevant. By placing abstract scientific principles into everyday, familiar contexts, students can form stronger links between existing knowledge and new learning, thus enhancing conceptual understanding.

This approach is supported by the Philippine Department of Education in the K–12 curriculum, particularly for STEM (Science, Technology, Engineering, and Mathematics) instruction. The curriculum prioritizes contextualization and localization so that learning is not just aligned with the best international practices

but also sensitive to local realities. Learners not only perform better academically but also show greater interest in careers related to Science when scientific concepts are connected to local environments and real-world problems. While localization specifically adapts lessons to the local community and its culture, contextualization connects what students learn to their prior experiences (Montero et al., 2022).

According to their research, this strategy works better than conventional teaching techniques. Pupils who receive instruction in this manner demonstrate increased motivation for learning, better academic achievement, and a more favorable attitude toward Science. By bridging the gap between scientific theory and practical application, this approach makes learning relevant and authentic.

This study showed that contextualized and localized learning activities assist learners in making their own meaning out of scientific concepts instead of through rote memorization. For instance, using local examples of plants, animals, and natural resources within the learners' environment, learners were more interested and were able to understand science concepts better.

In addition, the research highlighted that the learners acquired higher-order thinking abilities like analyzing, evaluating, and applying concepts in real-world contexts. Contextualization, therefore, not only promotes knowledge acquisition but also the construction of critical and problem-solving skills that are fundamental in STEM education. Besides, Montero and Geducos (2022) also emphasized that contextualized and localized learning results in a better classroom environment.

Lessons that are meaningful to the learners result in learner participation, confidence, and cooperation. The learners become active participants in the learning process, proving that contextualization not only enhances test performance but also reinforces integral growth. This proves its congruence with 21st-century learning objectives, wherein the applicability and pertinence of knowledge are given importance, together with academic success.

Although the advantages of localized learning are well known, little research has been done to precisely quantify how it affects third-grade pupils' academic performance in rural areas, particularly when integrated with the 5E learning cycle model. The majority of previous research, such as that of Montero and Geducos (2022), was conducted at the secondary or tertiary levels of education, leaving a gap in the literature on younger learners.

Furthermore, while the 5E model (Engage, Explore, Explain, Elaborate, Evaluate) is known to be a powerful inquiry-based model, there has not been much research into the ways in which its sequenced stages can complement or intersect with contextualized and localized instructional methods.

By contrasting the efficacy of a localized, context-based approach with conventional teaching techniques, this study seeks to close that gap. In particular, it will investigate how the blending of contextual STEM education with the 5E instructional model can enhance scientific conceptualization and performance among Grade 3 students.

2.4 Effectiveness of Contextualization and Localization in Teaching

Many schools are now introducing a place-based and context-rich dimension to the teaching of Science, with improved understanding and more motivation than for traditional instruction. Bringing Science topics in relation to students' experiences, background, and surroundings helps them feel connected, engaged, and relevant to students when they study content.

Montero and Geducos (2022) showed that students who were taught biology where instruction was linked to local context and in which students' experiences had been considered performed better than their counterparts, as it is known that situating educational initiatives within what the student already knows aids the effectiveness of teaching. It also enables learners to appreciate and comprehend their cultural heritage in education.

Similarly, a scoping review highlighted the benefits of linking K-12 STEM education to local contexts by Holmes et al. (2021). The study reported that such approaches increased student enjoyment, improved learning outcomes, and fostered more positive STEM career aspirations. However, challenges like time constraints and the need for community involvement were also noted (Holmes et al., 2021).

Moreover, according to Picardal et al. (2022), the study on the effectiveness of contextualization in Science instruction to enhance Science literacy in the Philippines found that incorporating local knowledge and contexts into teaching

strategies, such as using community-relevant examples and materials, positively impacted students' Science literacy.

Therefore, incorporating local contexts into Science education not only makes learning relatable but also fosters a deeper connection between students and their communities, ultimately enhancing engagement and understanding of Science.

However, while some research highlights the challenges faced in teaching STEM subjects at the elementary level, such as a lack of resources, teacher preparedness, and time constraints, few studies provide concrete frameworks for combining inquiry-based learning, such as the 5E model, with local knowledge, practices, and environmental contexts.

A systematic review by Koyunlu Ünlü and Dökme (2022) highlights that most empirical studies have focused on general applications of the 5E model, with limited exploration into its integration with context-specific STEM education tailored to local environments.

Addressing these gaps by investigating how the 5E model functions within a localized context-based STEM approach can provide valuable insights into how culturally relevant, hands-on learning experiences can improve young learners' scientific literacy and problem-solving skills.

CHAPTER 3

METHODOLOGY

3.1 Research Design

This study is experimental research using a one-group pretest and posttest design. The use of this design aimed to determine whether the pupils' learning improves after being taught using this specific method. To measure its impact, a pretest, posttest, and survey questionnaire were utilized. After establishing the design, a pretest was administered a day before the conduct of the study to establish pupils' baseline knowledge of the Science 3 topic. After that, pupils received instruction using the 5E lesson plan with localized and context-based STEM applications integrated into each phase of the lesson.

Following the intervention, a posttest was administered to measure the pupils' learning gains. Additionally, a survey questionnaire was implemented to determine the pupils' level of engagement during the instruction. The difference between the pretest and posttest results, along with insights from the survey, was analyzed to investigate the effectiveness of the 5E lesson plan in the localized context-based STEM approach in enhancing pupils' conceptual understanding and engagement in Science lessons.

3.2 Research Environment

This study was conducted at Sultan Naga Memorial Integrated School, which is in Barangay Poblacion, Sultan Naga Dimaporo, Lanao del Norte. Sultan Naga Memorial Integrated School is a public educational school founded in 2013. It offers senior high, junior high, and elementary education, and is recognised by the Department of Education (DepEd). This school serves diverse learners, including Meranaw and Christians. It aimed to equip pupils with essential skills and knowledge. This made the researchers choose this location, anticipating that it would yield better results in this study.

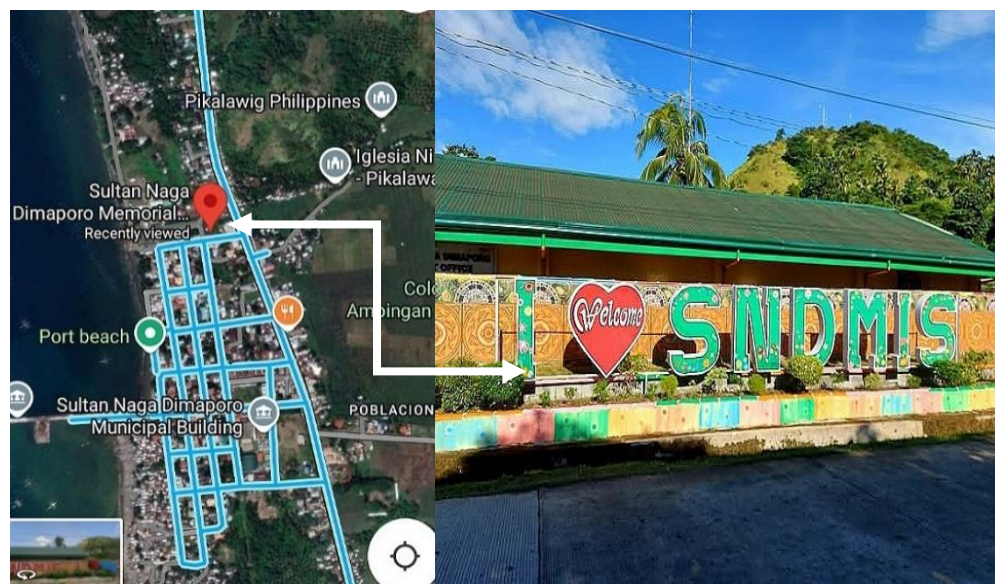


Figure 3.1 Geographical Location of Sultan Naga Dimaporo Memorial Integrated School.

3.3 Respondents of the Study and Sampling Technique

The respondents of this study were the grade 3 section Plato pupils of Sultan Naga Dimaporo Memorial Integrated School who are officially enrolled in the academic year 2025-2026. The researchers asked permission from the school principal and class adviser to conduct this study. These respondents, totaling 34 pupils under the Plato section, were chosen using a purposive sampling technique. Grade 3 pupils are anticipated to take the specific topic on the Basic Needs of Living Things (code S3LT-III-j14), which aligns with the focus of this research. This was done to determine the effectiveness of the Localized Context-Based STEM Approach using the 5E Lesson Plan in Grade 3 Science.

3.4 Research Instruments

This study utilized a pretest and posttest questionnaire to determine the conceptual understanding of the respondents, and a survey questionnaire to determine pupils' level of engagement during the intervention. During the intervention, the researchers taught about the Basic Needs of Living Things, i.e., Humans (air, water, food, and shelter), using the 5E lesson plan in a localized context-based STEM approach to grade 3 pupils as an instructional tool. The researchers were able to determine the conceptual understanding of the respondents through the instructional tools used for five days.

5E Localized Context-based STEM Lesson Exemplar. The 5Es stands for Engage, Explore, Explain, Elaborate, and Evaluate. This served as the researcher's instructional guide in a localized context-based STEM approach on how to teach the participants. The researchers made a 5E Localized Context-based STEM lesson plan about the Basic Needs of Living Things, i.e., humans (air, water, food, and shelter), and implemented it over five days following the 5E phases: Day 1 – Engage (introduction and motivation); Day 2 – Explore (hands-on group activity); Day 3 – Explain (discussion and presentation); Day 4 – Elaborate (application through prototype-making); and Day 5 – Evaluate (presentation and reflection).

Pretest and Posttest. The pretest and posttest were teacher-made assessments composed of 20 multiple-choice questions designed to evaluate pupils' prior knowledge of selected Grade 3 Science competencies. The items were aligned with the K to 12 Curriculum Guide and cover topics that were addressed in the localized lesson exemplar. Content validity of the pretest and posttest instruments was established through the utilization of a Table of Specifications (TOS), which guided the systematic distribution of test items according to the identified learning competencies, instructional objectives, and cognitive domains relevant to the study.

The pretest instrument was administered before the intervention to establish the baseline academic performance of the pupils. Whereas the posttest was administered to determine the learning gains of the pupils after the intervention.

A. Scoring Guidelines for the Respondents' Pretest and Posttest Scores

The pretest and posttest are composed of multiple-choice questions. The score is based on the following criteria, adapted from Bloom's Taxonomy-based assessment guidelines (Anderson and Krathwohl, 2001):

Range	Description	Interpretation
16-20	Excellent	Very Highly Achieved
11-15	Very Good	Highly Achieved
6-10	Average	Moderately Achieved
1-5	Poor	Not Achieved

B. Legend / Verbal Interpretation for Prototype Evaluation

The prototype is evaluated based on the criteria of Creativity and Relevance, Use of Local/Recyclable/Affordable Materials, and Teamwork and Presentation. The overall performance is interpreted using the following scoring plan, adapted from DepEd Order No. 8, s. 2015 – Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program.

Percentage Range	Description	Interpretation
90-100	Excellent	Outstanding
85-89	Very Good	Very Satisfactory
80-84	Good	Satisfactory
75-79	Fair	Fair Satisfactory
Below 75	Poor	Did Not Meet Expectation

Level of Engagement Survey Questionnaire. A survey questionnaire was designed to assess learners' participation, interest, and involvement during the lesson. It consisted of ten (10) indicators rated on a 3-point response scale and was administered after the intervention. This instrument was also pilot-tested to ensure its reliability and validity.

In determining the respondents' level of engagement, the rating scale below was utilized.

C. Scoring Plan for Level of Engagement

Response Option	Weight	Mean Range	Interpretation
Always	3	2.34 – 3.00	Highly Engaged
Sometimes	2	1.67 – 2.33	Engaged
Never	1	1.00 – 1.66	Not Engaged

3.5 Data Gathering

Ethical considerations were strictly observed throughout the conduct of the study. Approval to conduct the research was obtained from the Campus Research Ethics Committee (CREC), the school principal, and the class adviser. Written informed consent was secured from parents or guardians prior to the participation of the learners.

Additionally, parental and school authorization were obtained for the inclusion and publication of learner photographs used solely for academic and

documentation purposes. The researchers ensured that all learner information remained confidential and that photographs were used responsibly in accordance with ethical standards for research involving minors.

Before the intervention, the researchers personally administered the pretest; afterwards, the intervention was implemented, where the respondents were taught for five (5) consecutive days using the 5E lesson plan integrated in a localized, context-based STEM approach. After the intervention, a posttest questionnaire was administered to the participants, followed by the administration of the questionnaire on the level of engagement survey. Then, the researchers gathered and tabulated the data. Lastly, the data were analysed and interpreted.

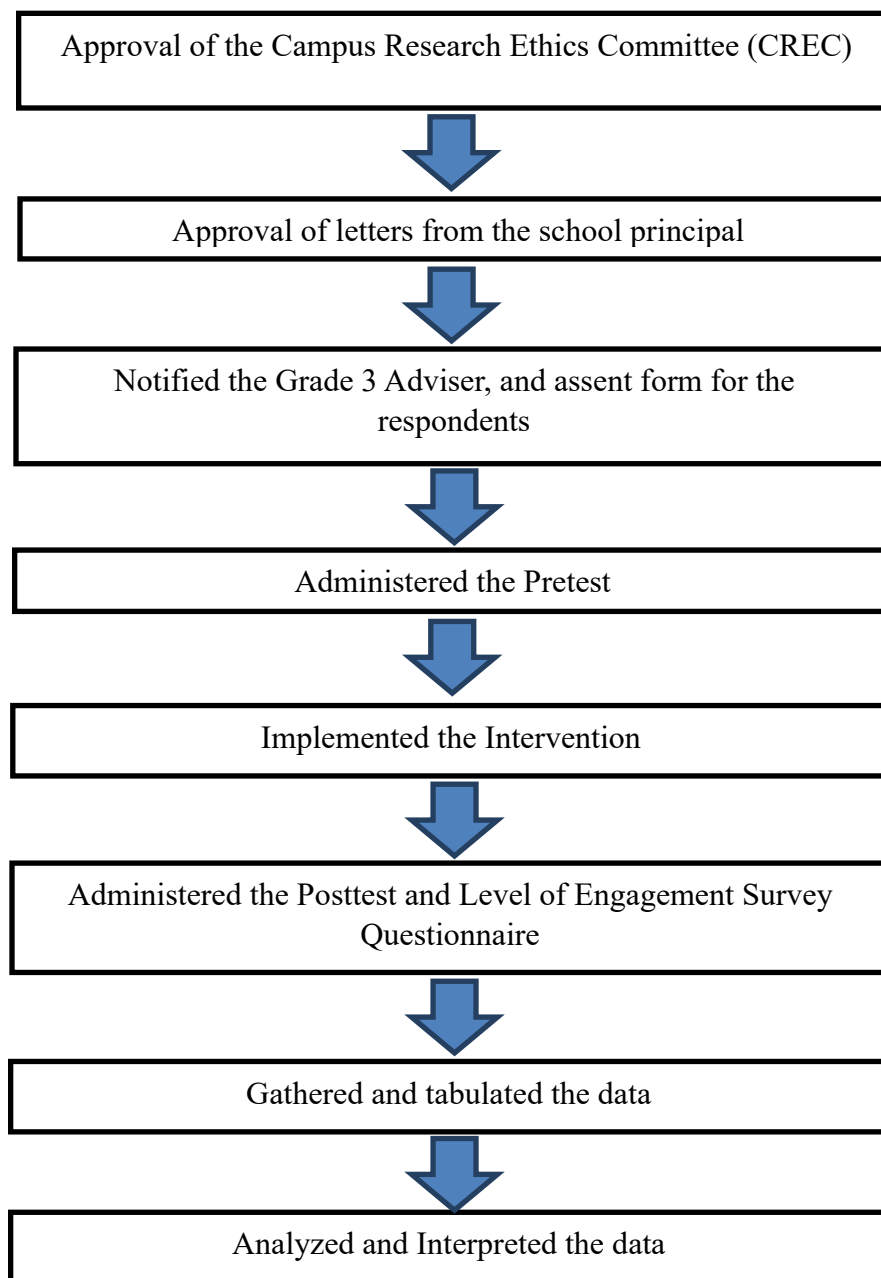


Figure 3.2 The Flowchart of the Data Gathering Procedures

3.6 Data Analysis

The data collected are processed and analysed using the statistical software **PSPP**, a program for statistical analysis of sampled data to ensure accuracy and reliability of results.

The following statistical tools were used to have an accurate analysis of the data gathered:

1. Frequency and Percentage Distribution. This tool was used to determine the number and percentage of respondents in terms of their age and gender. As well as the number and percentage of the pretest and posttest results. The frequency distribution was used to determine how many respondents selected each option in the survey questionnaire. This tool was used in SOPs 1, 2, and 3.

Formula:

$$P = \frac{f}{n} \times 100$$

Where:

P = Percentage

f = The frequency of a specific value

n = Total number of respondents

100 = Constant

2. Normality Test. A normality test is a statistical tool used to determine whether a set of data follows a normal distribution. This was used to determine the normality of the distribution of the data.

Formula:

$$W = \frac{\left(\sum_{i=1}^n a_i x_{(i)}\right)^2}{\sum_{i=1}^n (x_i - \bar{x})^2}$$

Where:

W = Shapiro-Wilk statistic

n = sample size

$x_{(i)}$ = the i -th ordered sample value (from smallest to largest)

x_i = the i -th sample value (original data)

\bar{x} = sample mean

a_i = constants (weights) derived from expected values of order statistics of a standard normal distribution

3. Wilcoxon Signed-Rank Test. This is a non-parametric statistical tool used to determine whether there is a significant difference between two related groups. In the context of this study, the Wilcoxon Signed-Rank Test was employed to compare the pretest and posttest scores of the participants within the same group, and when the sample size is large, the test statistic is converted into a Z -value. This tool was used in SOP 4.

Formula:

a. Wilcoxon Test Statistic:

$$T = (T^+, T^-)$$

Where:

T^+ = sum of all positive ranks

T^- = sum of all negative ranks

b. Z-value:

$$Z = \frac{T - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

Where:

T = Wilcoxon test statistic

n = number of nonzero differences

$\frac{n(n+1)}{4}$ = mean of the Wilcoxon distribution

$\sqrt{\frac{n(n+1)(2n+1)}{24}}$ = standard deviation of the Wilcoxon distribution

4. Weighted Mean. This tool was used to calculate the mean for each indicator in the Likert-scale survey, as well as the overall mean to determine the

level of engagement among respondents during the intervention. This tool was used in SOP 5.

Formula:

$$W = \frac{\sum x_i}{n}$$

Where:

W = Weighted mean average

\sum = The summation of the product of each score and its corresponding frequency

x = The actual score obtained

n = Total number of respondents

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Demographic Profile of the Respondents

4.1.1 Age

Table 4.1.1 presents the frequency and percentage distribution of the respondents according to age. Of the total respondents, eighteen (18) or 52.94% were eight (8) years old, nine (9) or 26.47% were nine (9) years old, three (3) or 8.82% were ten (10) years old, and two (2) or 5.88% were seven (7) years old. Meanwhile, respondents aged eleven (11) and twelve (12) each comprised one (1) respondent or 2.94% of the total sample.

The findings revealed that the majority of the respondents were eight (8) years old, accounting for 52.94% of the total number of participants. The predominance of learners within this age group suggests that the respondents were at an appropriate developmental stage to effectively engage in structured learning tasks and localized STEM-based approaches. This finding aligns with Piaget's Cognitive Development Theory, which identifies learners aged 7 to 11 as being in the Concrete Operational Stage, wherein logical thinking, classification, and problem-solving abilities begin to emerge and develop (Piaget, 1972; McLeod, 2018).

Hewitt and Forcino (2025) also emphasized that introducing STEM activities at this age significantly enhances learners' interest and understanding in Science lessons, as demonstrated by third-grade learners who showed great enthusiasm after participating in STEM lessons. Taken together, these insights underscore the importance of incorporating STEM-based models in elementary classrooms as they are developmentally appropriate and effective in fostering meaningful engagement and lifelong interest in Science, Technology, Engineering, and Mathematics.

Table 4.1.1 Frequency and Percentage Distribution of the Respondents' Age (n=34)

AGE	FREQUENCY	PERCENTAGE
7	2	5.88
8	18	52.94
9	9	26.47
10	3	8.82
11	1	2.94
12	1	2.94

4.1.2 Gender

Table 4.1.2 presents the frequency and percentage distribution of the respondents according to their gender. The result revealed that male learners comprise the majority of the respondents, representing 52.94% or eighteen (18) of

the total class, while females account for 47.06% or sixteen (16). Given that gender distribution may have an impact on classroom participation and engagement patterns, this slight predominance of boys should be taken into account when interpreting the study. Regardless of gender, middle childhood students are in the Concrete Operational Stage, where they acquire the logical thinking and problem-solving skills required for structured learning, according to Piaget (1972).

This finding is consistent with the study of Hewitt and Forcino (2025), which showed that during pre-instruction of STEM lessons, boy learners demonstrated greater interests in Science and Engineering than their female counterparts. Additionally, a 2023 study by the National Center for Science and Engineering Statistics (Emembolu, 2020) reveals that men make up a greater share of the STEM workforce than women, showing that women are less likely to enter the STEM field. The study also suggests that young students getting exposure to STEM can have a positive impact on their interest in the subjects, leading to an increase in the possibility of students pursuing STEM careers in the future.

This finding highlighted that early exposure to STEM education can positively impact students' interest in the subjects and should therefore be incorporated in elementary school classrooms. It also suggests a pre-existing gender difference in interest in Science and engineering among the respondents.

Table 4.1.2 Frequency and Percentage Distribution of Respondents' Gender
(n=34)

GENDER	FREQUENCY	PERCENTAGE
Male	18	52.94
Female	16	47.06

4.2 Pretest and Posttest Score Results of the Respondents

Table 4.2 presents the results of the pretest and posttest administered to the respondents. As reflected in the pretest results, twenty (20) respondents, representing 58.82% of the total class, obtained scores ranging from 11 to 15, which were interpreted as *Highly Achieved*. Ten (10) respondents or 29.41% obtained scores ranging from 6–10, corresponding to the interpretation of *Moderately Achieved*. Furthermore, three (3) respondents or 8.82% attained scores ranging from 16–20, interpreted as *Very Highly Achieved*, while one (1) respondent or 2.94% obtained a score ranging from 1–5, categorized as *Not Achieved*. These findings indicate that only a limited number of respondents demonstrated high academic performance before the integration of the 5E Lesson Plan within the Localized Context-Based STEM Approach.

In contrast, the posttest results presented in Table 4.3 revealed a marked improvement in the respondents' performance. Twenty-eight (28) respondents, representing 82.35% of the total class, obtained scores ranging from 16–20,

interpreted as *Very Highly Achieved*, while six (6) respondents or 17.65% attained scores ranging from 11–15, corresponding to the interpretation of *Highly Achieved*. Notably, none of the respondents fell under the categories of Moderately Achieved or Not Achieved in the posttest results.

The improvement observed in the pupils' posttest scores suggests that the localized context-based STEM approach integrated with the 5E learning cycle may have supported deeper conceptual understanding among Grade 3 learners through inquiry-driven and experiential learning activities. The findings support Constructivist Theory, which emphasizes that learners develop understanding through active engagement, exploration, and interaction with meaningful experiences. Through the localized STEM activities, learners were able to connect scientific concepts to familiar community-based situations, thereby supporting meaningful learning.

This finding is consistent with the study of R. V. Mendaño and R. J. T. Laceda (2025), who found that inquiry-based instructional models improve conceptual understanding through active learner participation, guided inquiry, and experiential learning activities.

Table 4.2 Pretest and Posttest Score Results of the Respondents (n=34)

Score	Pretest		Posttest		Verbal Interpretation
	f	%	F	%	
16-20	3	8.82	28	82.35	Very Highly Achieved
11-15	20	58.82	6	17.65	Highly Achieved
6-10	10	29.41	0	0.00	Achieved
1-5	1	2.94	0	0.00	Not Achieved

Figure 4.1 presents the line graph illustrating the comparison between the respondents' pretest and posttest results in the Science lesson using the 5E Lesson Plan integrated into a Localized Context-Based STEM Approach. As reflected in the graph, the respondents generally obtained lower scores in the pretest, with only a few learners classified under the *Very Highly Achieved* category, while some respondents fell under the *Not Achieved* category.

In comparison, the posttest results showed higher scores across most respondents. A greater number of learners were classified under the *Very Highly Achieved* category, while no respondents remained in the *Not Achieved* category. The comparison between the pretest and posttest results indicates an improvement in learners' performance following the implementation of the intervention. The consistently higher posttest scores suggest that the integration of the 5E Lesson

Plan within a Localized Context-Based STEM Approach may have contributed to learners' improved conceptual understanding in Science lessons.

This finding is consistent with the studies of Holmes et al. (2021) and Kostøl and Remmen (2022), which suggest that the contextual and localized application of lessons can support learners' retention and facilitate the transfer of knowledge across different situations, particularly when learning experiences are connected to meaningful real-world contexts.



Figure 4.1 Line Graph on the Respondents' Pretest and Posttest Results

4.3 Difference between the Pretest and Posttest Results of the Respondents

Table 4.3 presents the results of the Wilcoxon Signed-Rank Test conducted to determine the difference between the respondents' pretest and posttest scores. The computed Z-value of -5.10 exceeded the critical value of ± 1.96 at the 0.05 level of significance. The negative direction of the Z-value indicates that the posttest scores were generally higher than the pretest scores. Furthermore, the obtained p-value of 0.001 ($p < 0.05$) indicates that the difference between the two sets of scores was statistically significant. Based on these results, the null hypothesis stating that there was no significant difference between the pretest and posttest scores was rejected.

The findings indicate that the respondents obtained relatively higher scores in the posttest compared to the pretest following the implementation of the 5E Lesson Plan integrated into a Localized Context-Based STEM Approach. This suggests that the intervention may have contributed to improvements in learners' conceptual understanding of Science concepts.

This finding is consistent with the study of Putra et al. (2020), which examined the implementation of the 5E learning cycle strategy in enhancing pupils' conceptual understanding and learning motivation in Physics. The study reported that the instructional model encouraged active learner participation through a sequence of learning stages, which supported learners' understanding of the subject matter.

Additionally, beyond the use of a learning model such as the 5E learning cycle, effective instructional approaches are essential in fostering scientific attitudes and improving pupils' science learning outcomes. Research shows that both 5E-based instruction and contextualized STEM approaches significantly enhance students' conceptual understanding and engagement in science (Eroğlu & Bektaş, 2022; Montero & Geducos, 2022).

One such approach is STEM, which integrates Science, Technology, Engineering, and Mathematics as a key component of the 21st-century education.

Table 4.3 Difference between the Pretest and Posttest Results of the Respondents. (n=34)

p-value	Z-value	Level of Significance	Discussion
0.001	-5.10	0.05	H_0 . Rejected

**Significant*

4.4 Integration of the 5E Lesson Plan in the Localized Context-Based STEM Approach

The lesson began by asking the pupils questions such as *What are the basic things that humans need to survive?* In which the pupils eagerly responded with answers such as air, water, food, and shelter. Questions like this aim to pique the

pupils' interest in the target lesson, and this aligns with the first stage of the 5E model, which is Engagement.



Figure 4.2 Engagement Stage

On the second day of the instruction under the 5E stage, Exploration, the class was divided into two groups. Each group was given a water-related issue and tasked to come up with possible solutions using available and low-cost materials. Group 1 worked on the problem of dirty water caused by flooding. Their solution involved using materials such as rocks, minerals, cement, and water to prevent contamination. They explained that those could be used to make filters or barriers to stop dirty water from spreading during floods.

Group 2 was assigned the problem of garbage to water sources. Their solution included disposing of the garbage and throwing it away properly. They emphasized the importance of proper waste disposal to keep rivers and lakes clean and safe.

Each group presented its answers to the class. The *Exploration* stage encourages learners to investigate authentic problems in familiar environments. During this stage, learners explore scientific ideas through hands-on investigation, which supports the development of critical thinking and conceptual understanding. As stated by Qu, Wang, and Zhang (2024), inquiry-based learning significantly enhances pupils' ability to think critically, especially when learning activities are grounded in real-life contexts.

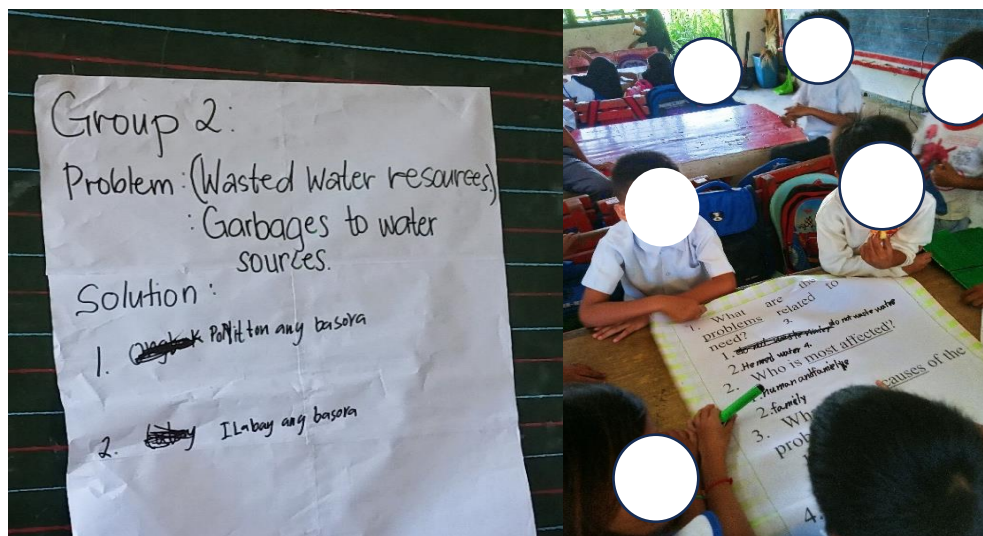


Figure 4.3 Exploration Stage

Following this was the *Explanation* stage on the third day, which is the stage where pupils begin to refine their critical thinking by engaging in scientific discourse, applying reasoning, and confronting misconceptions. According to Tytler et al. (2021), this dialogic approach not only enhances individual comprehension but also fosters collaborative meaning-making, especially when learners are encouraged to relate explanations to culturally relevant or community-based contexts.

In this stage, the lesson started by recalling what was discussed in the previous meeting. Then the class moved to the decision-making activity, where pupils were given a task to design a prototype that could address water-related issues within the community. Both Group 1 and Group 2 drew their own designs of their own versions of a water filter using a plastic bottle and added layers of cotton, rocks, soil, and sand. Then, they presented their works in front of the class.



Figure 4.4 Explanation Stage

Then, the intervention progressed to the *Elaboration* stage on the fourth day, where the pupils started making the actual water filter. They used simple and recycled materials. They were given enough time to collect what they needed and work as a group. Group 1 was able to make their filter correctly, unlike Group 2, which had some trouble. Upon checking, Group 2 layers were not arranged accordingly, unlike what Group 1 did. Upon knowing this, the pupils tried again after studying the output of Group 1 carefully.



Figure 4.5 Elaboration Stage

In line with this, Holmes et al. (2021) and Kostøl and Remmen (2022) suggested that contextual applications improve retention and the ability to apply knowledge across different scenarios, particularly when learning is embedded in meaningful, real-world contexts.

Lastly, the *Evaluation* stage on the fifth day emphasized the assessment of pupils' understanding through authentic tasks that apply to real-world applications, such as community-based projects or locally relevant scientific investigations. According to Fraser et al. (2021) and Gallay et al. (2021), this type of evaluation

has been found to enhance learners' motivation and deepen learning by providing meaningful opportunities to demonstrate knowledge and problem-solving skills.

In this stage, the prototypes of learners were evaluated through presentation and demonstration of their products through the bazaar activity, where many people in the community were invited to evaluate the prototype of each group. The pupils themselves presented their products and gave a brief description of them.



Figure 4.6 Evaluation Stage

4.5 Evaluation Result of the Water Filter Prototype.

Table 4.4 presents the evaluation results of the Water Filter prototype of the respondents according to their group. The Water Filter prototype is a self-made water filtration system that uses readily available materials to remove impurities

and contaminants from water. DIY water filters can be a cost-effective and creative way to purify water, especially in emergencies or areas with limited access to clean water. The respondents were divided into two groups, where each group drew their own design of a water filter using local and recyclable materials. Using their design, each group made its own version of a water filter.

The prototype of the two groups was evaluated by four (4) Science teachers from Sultan Naga Dimaporo Memorial Integrated School, together with six (6) invited visitors who served as guest judges. The projects were assessed based on three significant factors: creativity and relevance, use of local, recyclable, and affordable materials, and teamwork and presentation. The groups had the opportunity to present their work, explain how it functioned, and respond to questions from the panel. This gave the evaluators a clearer view of how well the students understood and applied their concepts.

Following the demonstrations, the judges shared their feedback. They were impressed by the creativity and effort that went into the projects, the collaboration between group members, and the effective utilization of recycled and low-cost materials. However, they offered recommendations for improvement, including simplifying the explanation for ease of understanding, enhancing confidence during presentation, and developing the design for better function and appearance.

When the scores were tallied, Group 2 came out on top with a total of 118 points or 98.33%, showing excellent creativity and teamwork, while Group 1

followed closely with 115 points or 95.83%, also performing very well. Both groups were praised for their hard work and were reminded that the main goal of the activity was not only competition but also learning, collaboration, and improvement.

The localized and hands-on STEM activities may have enhanced learners' engagement and conceptual understanding by allowing pupils to apply scientific concepts to real-world and community-based situations. This supports the findings of J. C. R. Bolanio and R. V. Mendaño (2025), who emphasized that contextualized STEM activities and experiential tasks strengthen learners' problem-solving skills and active participation.

Table 4.4 Evaluation Result of the Water Filter Prototype

Group	Percentage	Description	Verbal Interpretation
Group 1	98.33	Excellent	Outstanding
Group 2	95.83	Excellent	Outstanding

Group 1



Figure 4.7 Water Filter Prototype of Group 1

Description: This model utilizes a recycled plastic bottle cut in half and layered with cotton, sand, gravel, and rocks. The pattern of the materials was strictly adhered to achieve a proper step-by-step filtration system.

Function:

- Plastic bottle serves as the main container, keeping all filter layers intact and guiding the flow of water.
- Cotton serves as the initial barrier, catching fine dirt and particles.

- Rocks hold the layers in place and facilitate the draining of water at the bottom.
- Sand filters out smaller impurities and sediments.
- Gravel captures larger debris and regulates water flow.

Purpose: This model demonstrates that it is possible to make a functional water filter from inexpensive and recycled materials. It is evidence of the creativity and problem-solving abilities of the learners in solving dirty floodwater, purifying water, and making it safe for consumption.

Group 2



Figure 4.8 Water Filter Prototype of Group 2

Description: This model employs a reused plastic bottle with a series of layers consisting of cotton, sand, gravel, and rocks. Initially, the layers were incorrectly positioned, but after revising, the team was successful in establishing the correct filtration order.

Function:

- The plastic bottle holds all the filtration materials together and directs water to pass through each layer in order.
- Cotton is the initial layer that traps dirt and fine trash.
- Rocks support the filter and permit the cleaner water to run out at the bottom.
- Sand filters finer particles and sediments.
- Gravel filters larger debris and maintains consistent water flow.

Purpose: This prototype highlights the significance of trial-and-error in science learning. By correcting their design, Group 2 was able to create a functioning water filter that illustrates how recyclable and locally available materials can help minimize water pollution.

4.6 Respondents' Level of Engagement Based on the Survey Questionnaire.

Table 4.5 presents the results of the respondents' level of engagement during the intervention. The findings revealed that all indicators obtained weighted mean

scores ranging from 2.34 to 3.00, with corresponding interpretations of *Highly Engaged*. The highest weighted mean of 3.00 indicated that the respondents generally demonstrated positive engagement during the implementation of the 5E Localized Context-Based STEM lesson, particularly in activities involving local examples, group work, and experiments, which also appeared to support learners' attention throughout the Science lesson.

Meanwhile, the indicator related to sharing ideas obtained the lowest weighted mean of 2.90, which was likewise interpreted as *Highly Engaged*. This indicates that all measured aspects of learner engagement remained at a relatively high level during the intervention.

The observed level of learner engagement may be associated with the integration of localized and inquiry-based STEM activities that encouraged participation, collaboration, experimentation, and the application of concepts to real-life situations. The incorporation of familiar community contexts and locally available materials may have contributed to learners' interest and participation, as these enabled pupils to relate the Science lessons to their own experiences and environment.

This finding is consistent with the study of Mendaño and Laceda (2025), which reported that inquiry-based instructional models can support learner engagement through opportunities for exploration, questioning, and collaborative interaction. The study also noted that experiential STEM activities and

contextualized engineering tasks may contribute to learners' participation, creativity, and problem-solving skills. In the present study, the prototype-making activity provided learners with opportunities to engage with scientific concepts through hands-on experiences, which may have supported their participation throughout the intervention.

Overall, the findings suggest that the integration of a Localized Context-Based STEM Approach within the 5E learning cycle may provide a learning environment that supports learner participation and conceptual understanding in Science lessons.

Table 4.5 Respondents' Level of Engagement Based on the Survey Questionnaire (n=34)

Indicators	Weighted Mean	Interpretation
1. I enjoyed the Science lessons that used local stories or examples.	3.00	Highly Engaged
2. The hands-on activities helped me understand Science better.	2.97	Highly Engaged
3. I felt excited to join group work and experiments during the Science lessons.	3.00	Highly Engaged
4. The lessons made me curious and ask more questions about Science.	2.97	Highly Engaged

Table 4.6 (Continued) Respondents' Level of Engagement Based on the Survey Questionnaire (n=34)

5. I was able to focus and pay attention during the whole Science lesson.	3.00	Highly Engaged
6. I liked using things from our community or environment in our Science activities.	2.97	Highly Engaged
7. I shared my ideas and helped my classmates during Science activities.	2.9	Highly Engaged
8. The steps of the lesson (Explore, Explain, etc.) helped me learn Science well.	2.91	Highly Engaged
9. I felt confident to do the experiments or activities by myself.	3.00	Highly Engaged
10. I look forward to Science lessons like this again.	2.97	Highly Engaged
Grand Weighted Mean	2.97	Highly Engaged
<i>Legend: 1:00-1.66 Not Engaged 2.34-3.00 Highly Engaged</i>		
<i>1.67-2.33 Engaged</i>		

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study investigated the effectiveness of implementing the 5E Lesson Plan within a Localized Context-Based STEM Approach in teaching Grade 3 Science, particularly on the topic Basic Needs of Living Things. The findings indicated an improvement in the pupils' conceptual understanding, as reflected in the higher posttest scores compared to the pretest results. In the posttest, twenty-eight (28) pupils obtained scores categorized as Very Highly Achieved, while six (6) pupils were classified as Highly Achieved. These results indicate that the respondents generally performed better in the posttest assessment.

The results of the Wilcoxon Signed-Rank Test further indicated that the difference between the pretest and posttest scores was statistically significant, with a p-value of 0.001, which is lower than the 0.05 level of significance, and a computed Z-value of -5.10, which exceeded the critical value of ± 1.96 . Based on these findings, the null hypothesis was rejected, suggesting that the implementation of the localized 5E STEM approach may have contributed to the observed improvement in pupils' conceptual understanding.

Furthermore, the results of the engagement survey indicated that the pupils demonstrated a high level of engagement during the intervention. The respondents

showed participation and interest in activities involving local materials, group tasks, questioning, and experimental activities.

This observation was also reflected in the pupils' completion of the water filtration prototype activity using recycled bottles, sand, cotton, and rocks. The activity provided learners with opportunities to apply concepts through hands-on tasks that involved collaboration, problem-solving, and the use of locally available materials.

In summary, the findings of the study indicate that integrating the 5E lesson model within a localized context-based STEM approach may support the development of conceptual understanding and learner engagement in Science 3. The inquiry-oriented and experiential nature of the intervention provided opportunities for pupils to actively construct knowledge through hands-on activities, collaboration, and contextualized problem-solving tasks.

The significant improvement observed between pretest and posttest scores suggests that the intervention holds promise as a learner-centered instructional approach for elementary Science education. However, considering the limitations associated with the one-group experimental design, the findings should be interpreted with caution and should not be viewed as definitive evidence of causality.

Future research employing larger samples, comparison groups, and longer intervention periods is recommended to further examine the effectiveness of

localized context-based STEM instruction integrated with inquiry-driven learning models.

5.2 Recommendations

Based on the findings and conclusions of this research, the following are recommended:

1. Learners should be motivated to maintain their active involvement in localized and inquiry-based Science activities. They need to be coached to become resourceful, collaborative, and inquiring learners capable of applying classroom principles to real-life issues.

2. Teachers should be encouraged to always use the 5E instructional model with localized STEM contexts in their instructional practice. Instruction should be planned to utilize local resources and real-world applications so that students can relate abstract ideas to their daily lives.

3. Teachers should also participate in seminars, workshops, and training sessions to enhance their contextualized and inquiry-based Science teaching skills.

4. School Administrators are urged to provide support through training, workshops, and adequate resources to help teachers develop and implement localized STEM lessons aligned with the 5E model. They should also encourage the consistent integration of this approach to strengthen Science teaching and learning.

5. Parents and Guardians are urged to support Science learning at home by leading their children in applying real-life applications of Science concepts through simple experiments using locally available materials and community examples.

6. Future Researchers may research the long-term impact of the 5E model on localized STEM education in Science learning, cross-subject and grade-level comparisons, and the incorporation of indigenous knowledge systems in contextualized Science teaching.

REFERENCES

- Acesta, A. (2020). *Analisis kemampuan higher order thinking skills (HOTS) siswa materi IPA di sekolah dasar. Quagga: Jurnal Pendidikan dan Biologi*, 12(2). <https://doi.org/10.25134/quagga.v12i2.2831>
- Agustina, R., Huda, I., & Nurmaliah, C. (2020). *Implementasi pembelajaran STEM pada materi sistem reproduksi tumbuhan dan hewan terhadap kemampuan berpikir ilmiah peserta didik SMP. Jurnal Pendidikan Sains Indonesia*, 8(2). <https://doi.org/10.24815/jpsi.v8i2.16913>
- Aminoto, T. (2020). Changes in students' cognitive structure on the concept of light. *Physics Education Research Journal*, volume(issue), pages. <https://journal.walisongo.ac.id/index.php/perj/article/view/13658/4689>
- Anif, S., Sutopo, A., & Prayitno, H. J. (2020). *Lesson study validation: Model for social and natural sciences teacher development in the implementation of the national curriculum in Muhammadiyah schools, Indonesia. Universal Journal of Educational Research*, 8(1), 253–264. <https://doi.org/10.13189/ujer.2020.080132>
- Ardianti, S. D., Sulisworo, D., Pramudya, I., & Raharjo, T. J. (2020). *Innovating STEM education: Teacher reflections on challenges and strategies. Journal of Education and Learning*.
- Astawan, I. M., Putri, N. K., & Septiana, D. (2022). *The effect of STEM-based scientific learning on students' critical and creative thinking skills. Jurnal Pendidikan IPA Indonesia*. <https://journal.unnes.ac.id/nju/index.php/jpii>
- Beswick, K., & Fraser, S. (2019). *Developing mathematics teachers' 21st-century competence for teaching in STEM contexts. ZDM Mathematics Education*, 51(6), 955–965. <https://doi.org/10.1007/s11858-019-01084-2>

- Bybee, R. W. (2010). *What is STEM education?* *Science*, 329(5995), 996. <https://doi.org/10.1126/science.1194998>
- Bybee, R. W. (2013). *The case for STEM education: Challenges and opportunities*. NSTA Press.
- Bybee, R. W. (2010). *The BSCS 5E instructional model: Creating teachable moments*. NSTA Press.
- Bruce, W., Funmilayo, B., & Favour, K. (2025). *Community-based programs and their influence on literacy skills of elementary learners in the Philippines*. <https://www.researchgate.net>
- Bolano, J. C. R., & Mendaño, R. V. (2025). *Simplified wave energy converter: An apparatus for teaching energy transformation*. *International Journal of Open-Access, Interdisciplinary & New Educational Discoveries of ETCOR Educational Research Center (iJOINED ETCOR)*, 4(4). <https://doi.org/10.63498/etcor471>
- Cakmakci, G., Aydeniz, M., Brown, A., & Makokha, J. (2020). *Situated cognition and cognitive apprenticeship learning*. In *Science Education in Theory and Practice*. Springer. https://doi.org/10.1007/978-3-030-43620-9_20
- Canales, A., Vásquez, C., & Paredes, S. (2024). *The 5E instructional model is used for the meaningful learning of science and technology*. *Frontiers in Education*. <https://doi.org/10.3389/educ.2024.1435530>
- Casad, B. J., Petzel, Z., & Ingalls, E. (2019). *A model of threatening academic environments predicts women STEM majors' self-esteem and engagement in STEM*. *Sex Roles*, 80, 469–488. <https://doi.org/10.1007/s11199-018-0942-4>

- Cimpian, J. R., Kim, T. H., & McDermott, Z. T. (2020). *Understanding persistent gender gaps in STEM*. *Science*, 368(6497), 1317–1319. <https://doi.org/10.1126/science.aba7377>
- Conradty, C., & Bogner, F. X. (2018). *From STEM to STEAM: How to monitor creativity*. *Creativity Research Journal*, 30(3), 233–240. <https://doi.org/10.1080/10400419.2018.1488195>
- Colburn, A. (2000). *An inquiry primer*. *Science Scope*, 23(6), 42–44.
- Corlu, M. S. (2014). *Call for STEM education research in the Turkish context*. *Turkish Journal of Education*, 3(1), 4–10.
- Department of Education. (2016). *K to 12 Curriculum Guide – Science (Grade 3-10)*. https://www.deped.gov.ph/wp-content/uploads/2019/01/Science-CG_with-tagged-sci-equipment_revised.pdf
- Deveci, İ., & Karteri, İ. (2020). *Context-based learning supported by environmental measurement devices in science teacher education: A mixed method research*. *Journal of Biological Education*, 1–26. <https://doi.org/10.1080/00219266.2020.1821083>
- Dewey, J. (1938). *Experience and education*. New York, NY: Macmillan.
- Dewi, N. L., Dantes, N., & Sadia, I. W. (2013). *Pengaruh model pembelajaran inkuiri terbimbing terhadap sikap ilmiah dan hasil belajar IPA*. *Jurnal Pendidikan Dasar Ganesha*, 3(1). <https://doi.org/10.19184/jpf.v6i2.5020>
- Dianal, Turmudi, and Yohannes (2021). *STEM education is an interdisciplinary and integrated approach to teaching*. <https://www.researchgate.net/publication/370229578>

- Educational Technology. (2024). *5E instructional design model*. <https://educationaltechnology.net/5e-instructional-design-model/>
- Emembolu I, Padwick A, Shimwell J, Sanderson J, Davenport C, Strachan R. *Using action research to design and evaluate sustained and inclusive engagement to improve children's knowledge and perception of STEM careers*. *Int J Sci Educ*. 2020;42(5):764–82. <https://doi.org/10.1080/09500693.2020.1729442>
- Eroğlu, S., & Bektaş, O. (2022). *The effect of 5E-based STEM education on academic achievement, scientific creativity, and views on the nature of science*. *Learning and Individual Differences*, 98, 102181. <https://doi.org/10.1016/j.lindif.2022.102181>
- Fitriyanti, F., Farida, and Zikri, A. (2020). *Peningkatansikap dan kemampuanberpikirlmiahsiswamelalui model PBL di sekolahdasar*. *Journalbasicedu*. <https://doi.org/10.31004/basicedu.v4i2.376>
- Fraser, S., Attard, C., and Holmes, K. (2021). *The place-based STEM-alignment framework: A tool for observing and documenting place-based STEM discourses in rural, regional, and remote (RRR) communities*. *Frontiers in Education*.
- Han, J., Kelley, T. R., & Knowles, J. G. (2021). *Factors influencing student STEM learning: Self-efficacy and outcome expectancy, 21st century skills, and career awareness*. *Journal for STEM Education Research*, 4(2), 117–137. <https://doi.org/10.1007/s41979-021-00053-3>
- Harianti, A., Malinda, M., Nur, N., Suwarno, H. L., Margaretha, Y., & Kambuno, D. (2020). *Peran pendidikan kewirausahaan dalam meningkatkan motivasi, kompetensi, dan menumbuhkan minat mahasiswa*. *Jurnal Bisnis dan Kewirausahaan*, 16(3), 219–228. <https://doi.org/10.31940/jbk.v16i3.2194>

- Hewitt, T., & Forcino, F. (2025). *The influence of a STEM unit on the interest in and understanding of science and engineering among elementary girls and boys*. *Discover Education*, 4, 20. <https://doi.org/10.1007/s44217-025-00404-x>
- Holmes, K., Berger, N., Mackenzie, E., Attard, C., Johnson, P., Fitmaurice, O., O'Meara, N., and Ryan, V. (2021). *Editorial: The impact of place-based contextualised curriculum on student engagement and motivation in STEM education*. *Frontiers in Education*.
- Holmes, K., Mackenzie, E., Berger, N., and Walker, M. (2021). *Linking K-12 STEM pedagogy to local contexts: A scoping review of benefits and limitations*. *Frontiers in Education*, 6, Article 693808. <https://doi.org/10.3389/feduc.2021.693808>
- Johnson, A., & Elliott, S. (2020). *Culturally relevant pedagogy: A model to guide cultural transformation in STEM departments*. *Journal of Microbiology & Biology Education*, 21(1). <https://doi.org/10.1128/jmbe.v21i1.2097>
- Kang, H., Calabrese Barton, A., Tan, E., Simpkins, S. D., Rhee, H., & Turner, C. (2018). *How do middle school girls of color develop STEM identities? Middle school girls' participation in science activities and identification with STEM careers*. *Science Education*, 103(2), 418–439. <https://doi.org/10.1002/sce.21492>
- Kartal, B., and Tasdemir, A. (2021). *Pre-service teachers' attitudes towards STEM: differences based on multiple variables and the relationship with academic achievement*. *International Journal of Technology in Education (IJTE)*. <https://doi.org/10.46328/ijte.58>
- Kelley, T. R., & Knowles, J. G. (2016). *A conceptual framework for integrated STEM education*. *International Journal of STEM Education*, 3(11).

- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development (2nd ed.)*. Upper Saddle River, NJ: Pearson Education.
- Koyunlu Ünlü, Z., & Dökme, İ. (2022). *A systematic review of the 5E model in science education: Proposing a skill-based STEM instructional model within the 21st-century skills*. *International Journal of Science Education*, 44(15), 2404–2428. <https://doi.org/10.1080/09500693.2022.2114031>
- Kuba, M. R., Meha, A. M., & Blegur, J. (2020). *Pengaruh model pembelajaran bersiklus (learning cycle 5E) terhadap kemampuan berpikir kritis siswa*. *Edumaspul: Jurnal Pendidikan*. <https://doi.org/10.1007/s41979-021-00053-3>
- Lin, T. J., and Chang, C. Y. (2020). *The impact of STEM learning on learning achievement and interest: A meta-analysis*. *International Journal of STEM Education*. <https://doi.org/10.1186/s40594-020-00236-1>
- Maine Department of Education. (2021). *Conceptual understandings*. <https://www.maine.gov/doe/learning/II/conceptualunderstandings>
- Maison, M., Haryanto, H., Ernawati, M. D. W., Ningsih, Y., Jannah, N., Puspitasari, T. O., and Putra, D. S. (2020). *Comparison of student attitudes towards natural sciences*. *International Journal of Evaluation and Research in Education*. <https://doi.org/10.11591/ijere.v9i1.20394>
- McLeod, S. (2018). Jean Piaget's theory of cognitive development. *Simply Psychology*. <https://www.simplypsychology.org/piaget.html>
- Mendaño, R. V., & Laceda, R. J. T. (2025). *7E's learning model in teaching kinematics for senior high school STEM*. *Ignatian International Journal for Multidisciplinary Research*. <https://doi.org/10.5281/zenodo.15034388>


- Melgarejo, T. F. V., Atanacio, L. M. M., Leandro, A. I. C., Faustino, L. K. B., Rivarola, M. M. C., López, J. R. A., & Chávez, J. T. G. (2024). *The 5E instructional model is used for the meaningful learning of science and technology*. *Frontiers in Education*. <https://doi.org/10.3389/feduc.2024.1435530>
- Montero, J., et al. (2022). *Improved conceptual understanding in learning biology through localized and contextualized learning activities*. *International Journal of Multidisciplinary: Applied Business and Education*. Research (IJMABER). <https://ijmaberjournal.org/index.php/ijmaber/article/view/523>
- National Center for Science and Engineering Statistics. (2023). *Diversity and STEM: Women, minorities, and persons with disabilities* (NSF 23-315). <https://nces.nsf.gov/pubs/nsf23315/report/the-stem-workforce>
- Nguyen, T. D. (2024). *The supply and quality of STEM teachers*. *Humanities and social sciences communications*. <https://doi.org/10.1057/s41599-025-04648-8>
- Nguyen, T. P. L., Nguyen, T. H., & Tran, T. K. (2020). *STEM education in secondary schools: Teachers' perspective towards sustainable development*. *Sustainability*, *12*(21), 8865. <https://doi.org/10.3390/su12218865>
- OECD. (2017). *PISA 2015 assessment and analytical framework: Science, reading, mathematics, and financial literacy*. OECD Publishing. <https://doi.org/10.1787/9789264281820-en>
- Piaget, J. (1952). *The origins of intelligence in children* (M. Cook, Trans.). New York, NY: International Universities Press. (Original work published 1936)
- Piaget, J. (1972). *The psychology of the child* (H. Weaver, Trans.). Basic Books. (Original work published in 1966)

- Picardal, M., et al. (2022). *Effectiveness of contextualization in science instruction to enhance science literacy in the Philippines: A meta-analysis*. ResearchGate. https://www.researchgate.net/publication/358201544_Effectiveness_of_Contextualization_in_Science_Instruction_to_Enhance_Science_Literacy_in_the_Philippines_A_Meta-Analysis
- ProctorEdu. (2025). *Pre-assessment: Definition and meaning*. <https://proctoredu.com/glossary/pre-assessment>
- Psych Educ. (2023). *Contextualized and Localized Science Teaching and Learning Materials and Their Characteristics to Improve Students' Learning Performance*.
- Pozas, M., Löffler, P., Schnotz, W., & Kauertz, A. (2020). *The effects of context-based problem-solving tasks on students' interest and metacognitive experiences*. *Open Education Studies*, 2(1), 112–125. <https://doi.org/10.1515/edu-2020-0118>
- Putra, F., Kholifah, I. Y. N., Subali, B., & Rusilowati, A. (2020). *5E learning cycle strategy: Increasing conceptual understanding and learning motivation*. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 9(2), 195–206. <https://ejournal.radenintan.ac.id/index.php/al-biruni/article/view/2898>
- Republic Act No. 10533. (2013, May 15). *The Enhanced Basic Education Act of 2013*. Official Gazette. <https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533/>
- Setiawan, A., Suparman, S., & Suhandi, A. (2017). *The effectiveness of the 5E learning cycle model on conceptual understanding: A meta-analysis study*. *Journal of Physics: Conference Series*, 895(1), 012130. <https://doi.org/10.1088/1742-6596/895/1/012130>


- Suchman, J. R. (1964). *Inquiry development program*. Science Research Associates.
- Texas Education Agency. (2020). *STEM instructional planning guide (Version 3)*. https://tea.texas.gov/sites/default/files/STEM_Instructional_Planning_Guide_v3_FINAL_1134627_12-2020.pdf
- The Free Dictionary. (n.d.). Post-test. *In The American Heritage Dictionary of the English Language (5th ed.)*. <https://www.thefreedictionary.com>
- The Grove Center. (n.d.). *The 5Es*. Penn State University. <https://grovecenter.science.psu.edu/technology/instructional-design/the-5es>
- U.S. Bureau of Labor Statistics. (2020). *Employment in STEM occupations is projected to grow*. <https://www.bls.gov>
- Utamni, N. L. P., Maegala, A. A. A., and Purwadi, I. N. (2021). *The implementation of Vygotsky, L. S. (1978)*.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. & Trans.). Cambridge, MA: Harvard University Press.
- Wang, H., Moore, T. J., Roehrig, G. H., and Park, M. S. (2011). *STEM integration: Teacher perceptions and practice*. *Journal of Pre-College Engineering Education Research (J-PEER)*. <https://doi.org/10.7771/2157-9288.1041>

APPENDIX A

Ethical Clearance Certificate



Republic of the Philippines
MINDANAO STATE UNIVERSITY
LANAO DEL NORTE AGRICULTURAL COLLEGE
 Ramin, Sultan Naga Dimaporo, Lanao del Norte, Philippines



ETHICAL CLEARANCE CERTIFICATE

Date: June 24, 2025
Protocol No: 062-2025
Certificate Reference Number: SR-061-2025
Type of review: EXPEDITED

Project Title: Investigating the Effectiveness of Localized Context-Based STEM Approach using 5E Lesson Plan in Teaching Science 3

Nature of Project: Student research

Principal Researcher: Zuhara M. Tampaogao
 Namila L. Macagaan

Co-researcher: a/Prof. Settie-Zhymah S. Padate

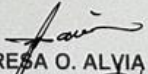
On behalf of the Campus Research Ethics Committee (CREC), the above type of review is hereby granted with respect to the undertakings contained in the project as mentioned above and the research instruments. Should any other instruments be used or any changes in the methodologies, these require an immediate report to CREC and separate authorization must be sought.

The researcher/s may therefore commence with the research from the date of this certificate, using the reference number indicated above.

The CREC retains the right to:


1. Withdraw or amend this Ethical Clearance if:
 - Any unethical principles or practices are revealed or reported.
 - Relevant information has been withheld or misrepresented.
 - The conditions contained in the Certificate have not been adhered to.
2. Request a progress report or its equivalent during the course or after the completion of the project.

For and in the absence of the Chairperson:


ETHEL THERESA O. ALVIA
 CREC Chairperson *Stamp* **June 24-2025**

APPENDIX B

Permission Letter to the School Principal



REPUBLIC OF THE PHILIPPINES
MINDANAO STATE UNIVERSITY-SULTAN NAGA DIMAPORO
 SUSTAINABILITY | NURTURING EXCELLENCE | DEDICATION TO SERVICE

July 22, 2025

RIZZA V. BANDIALA
 Principal
 Sultan Naga Dimaporo Memorial Integrated School
 Poblacion, Sultan Naga Dimaporo, Lanao del Norte

Dear Ma'am,



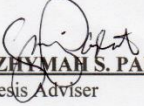
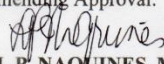
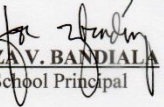
Warm Greetings!

We are students from the College of Education of Mindanao State University – Sultan Naga Dimaporo, taking up Bachelor of Elementary Education. As part of our academic requirements, we are preparing to conduct a research entitled “**Investigating the Effectiveness of Using the 5E Lesson Plan within a Localized Context-Based STEM Approach in Teaching Grade 3 Science**”.

In connection with this, we respectfully request your permission from your good office to allow us to conduct a **teaching demonstration** in your school, which our respondents will be grade 3 pupils particularly in the Science subject. Please be assured that all information gathered will be treated with strict confidentiality and will be used solely for academic purposes.

We sincerely thank you for your time, support, and cooperation you may extend to us.

Respectfully yours,

 <u>ZUHARA M. TAMOGAO</u> Researcher	 <u>NAMICA L. MACAGAAN</u> Researcher
Noted:  <u>SETTIE-ZHYMAN S. PADATE, MA</u> Thesis Adviser	Recommending Approval:  <u>LIEZEL P. NAQUINES, MScIED</u> Chairperson, College of Education
Approved:  <u>RIZZA V. BANDIALA</u> School Principal	

APPENDIX C

Permission Letter to the Class Adviser



REPUBLIC OF THE PHILIPPINES
MINDANAO STATE UNIVERSITY-SULTAN NAGA DIMAPORO
 SUSTAINABILITY | NURTURING EXCELLENCE | DEDICATION TO SERVICE

July 22, 2025

JUNAIDA O. DIMAPORO
 Grade 3 Adviser
 Sultan Naga Dimaporo Memorial Integrated School

Dear Ma'am,


Warm Greetings!

We are students from the College of Education of Mindanao State University – Sultan Naga Dimaporo, taking up Bachelor of Elementary Education. As part of our academic requirements, we are preparing to conduct a research entitled “**Investigating the Effectiveness of Using the 5E Lesson Plan within a Localized Context-Based STEM Approach in Teaching Grade 3 Science**”.

In connection with this, we respectfully request your permission from your class to allow us to conduct a **teaching demonstration** in your class section, which our respondents will be grade 3 pupils particularly in the Science subject. Please be assured that all information gathered will be treated with strict confidentiality and will be used solely for academic purposes.


We sincerely thank you for your time, support, and cooperation you may extend to us.

Respectfully yours,

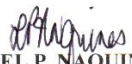

ZUHARA M. TAMOGAO
 Researcher


NAMILA L. MACAGAAN
 Researcher


Noted:


SETTIE-ZHYMAH S. PADATE, MA
 Thesis Adviser

Recommending Approval:


LIEZEL P. NAQUINES, MScIED
 Chairperson, College of Education

Approved:


JUNAIDA O. DIMAPORO
 Subject Teacher

APPENDIX D

Permission Letter to the Respondents



REPUBLIC OF THE PHILIPPINES
MINDANAO STATE UNIVERSITY-SULTAN NAGA DIMAPORO
 SUSTAINABILITY | NURTURING EXCELLENCE | DEDICATION TO SERVICE

July 22, 2025

THE RESPONDENTS

Sultan Naga Dimaporo Memorial Integrated School
 Poblacion, Sultan Naga Dimaporo, Lanao del Norte

Our Dear Grade 3 Pupils,

Warm Greetings!

We are kindly asking for your cooperation in participating in our teaching demonstration, which is an important part of our research study. Your active participation will help us gather meaningful results and fulfill the requirements of our study.

Your involvement is highly appreciated, and we assure you that all information obtained from this activity will be kept strictly confidential and used only for academic purpose.

We sincerely thank you for your time, support, and cooperation you may extend to us.

Respectfully yours,

ZUHARA M. TAMOGAO
 Researcher

NAMILA L. MACAGAAN
 Researcher

Noted:

SETTIE-ZHYMAH S. PADATE, MA
 Thesis Adviser

Approved:

JUNAIDA O. DEMAPORO
 Adviser

APPENDIX E**Test questionnaire for pre-test**

Name: _____
Age: _____ Date: _____
Gender: Male female

Test I. Multiple Choice

INSTRUCTION: Read each question carefully. Encircle the letter of the correct answer.

1. **When can food become dirty or unsafe?**
 - A. When flies land on it
 - B. When it's cooked well
 - C. When it's covered
 - D. When it's in the fridge
2. **What can make the air dirty?**
 - A. Burning trash
 - B. Walking to school
 - C. Riding a bike
 - D. Planting trees
3. **How can we help take care of the Earth?**
 - A. Plant trees and throw trash properly
 - B. Burn trash
 - C. Throw trash in rivers
 - D. Use cars for short trips
4. **What happens when you eat healthy food?**
 - A. You feel sleepy
 - B. You get sick
 - C. You grow strong
 - D. You lose energy
5. **What is the best way to keep your school clean with your classmates?**
 - A. Throw trash behind the classroom
 - B. Wait for the teacher to clean everything
 - C. Tell others not to clean
 - D. Make a cleaning schedule and work together

6. How can you save water at home?

- A. Take long baths
- B. Let taps run
- C. Take short showers
- D. Play with water

7. Why should we not waste water?

- A. It is free
- B. We need it to live
- C. It makes us wet
- D. It's hard to find

8. What does food give our bodies?

- A. Water
- B. Energy
- C. Dirt
- D. Toys

9. How can we build a home that helps the Earth?

- A. Use solar panels and grow plants
- B. Use lots of plastic
- C. Make it loud and dirty
- D. Leave the roof leaking

10. Why do we eat food every day?

- A. To grow strong
- B. To sleep more
- C. To play
- D. To make friends

11. What is a good habit at home?

- A. Wasting water
- B. Playing with water
- C. Washing cars daily
- D. Using water wisely

12. How can we help other people?

- A. Ignore them
- B. Break their homes
- C. Help build safe homes
- D. Push them away

13. **What does a house protect us from?**
- A. Books
 - B. Toys
 - C. Chairs
 - D. Heat, cold, and rain
14. **Why do plants need water?**
- A. To play in the mud
 - B. To grow
 - C. To clean the pot
 - D. To fill the garden
15. **What should you do if someone throws trash on the ground?**
- A. Throw more trash
 - B. Walk away
 - C. Tell an adult or pick it up
 - D. Laugh at them
16. **Why do we need water?**
- A. To stay healthy
 - B. To watch TV
 - C. To sleep
 - D. To write
17. **What do we breathe in to stay alive?**
- A. Smoke
 - B. Oxygen
 - C. Nitrogen
 - D. Carbon dioxide
18. **What should you do if your friend drinks water from a dirty puddle?**
- A. Do nothing
 - B. Say it's okay
 - C. Give clean water and explain why
 - D. Drink it too
19. **What would you do if your friend wanted to waste water, but you knew it was wrong?**
- A. Help them waste more water
 - B. Tell them it's okay

C. Talk to them about saving water

D. Laugh and walk away

20. **Why do we need a house?**

A. To watch TV

B. To stay safe and warm

C. To play inside

D. To eat food

APPENDIX F

Detailed Lesson Plan

Student Teacher: Zuhara M. Tampogao **Date:** July 28, 2025
Name of Cooperating Teacher: Junaida O. Dimaporo
Subject Taught: Science 3
Subject Matter: Basic Needs of Living Things i.e. humans (air, food, water, and shelter)
School: Sultan Naga Dimaporo - Memorial Integrated School

A DETAILED 5-DAY LESSON PLAN IN SCIENCE III (DAY 1)

I. OBJECTIVES

After the lesson, students' should be able to:

- a. identify the needs of living things i.e. humans' (air, food, water, and shelter);
- b. determine the issues within the community related to the basic needs of humans' (air, food, water, and shelter); and
- c. recognize that there is a need to protect and conserve the environment.

II. SUBJECT MATTER

A. Topic: Basic Needs of Living Things i.e. Humans (air, food, water, and shelter)

B. References:

1. Department of Education (DepEd). 2016. K to 12 Curriculum Guide SCIENCE [Curriculum Guide].
2. Glenn, E. (n.d.). *LP Basic needs of living things*. Scribd. <https://www.scribd.com./documents/819079060/Lp-Basic-Needs-of-living-things>

C. Materials: Visual Aids, TV, and PPT presentation

D. Teaching Strategy: Inquiry Method

E. Learning Model: 5E Model (Engage, Explore, Explain, Elaborate, and Evaluate)

F. Teaching Approach: STEM Approach (Science, Technology, Engineering, and Mathematics)

III. LEARNING PROCEDURE

5E PHASE	STEM STAGE	TEACHER'S ACTIVITY	STUDENTS' ACTIVITY
Engage	Identification of Social Issues	<p>Children, what do you think are the things the humans like us needs to survive?</p> <p>Brilliant! You have an idea!</p> <p>This time, I want you to take a look at the video I'm going to play in the TV and prepare to answer some questions I will ask after showing the video.</p> <p>(Teacher shows video about what are the basic needs of humans to survive) Retrieved from: https://youtu.be/onH5J7Jepcl?feature=shared</p> <p>Based on the video you watched, what are our needs?</p> <p>And where do we get all these?</p> <p>Why do you think these are necessary for humans' survival? Discuss each.</p>	<p>Teacher, humans' needs water and foods to survive!</p> <p>Teacher, we need air, water, food, and shelter to survive.</p> <p>We get air, water, food, and shelter from the environment. The air comes from the sky and trees. Water comes from rain, rivers, and lakes. Food comes from plants and animals. We use things from nature to build our shelters.</p>

		<p>Brilliant! Now, why is there a need to protect and conserve these needs?</p> <p>Group Activity 1:</p>	<p>Teacher, air is needed for human survival because it contains oxygen, and our bodies need oxygen to live.</p> <p>Teacher, humans need water to live. Water helps us stay cool, gives us energy, and it keeps our body working well.</p> <p>Teacher, humans need food to live. Food gives us energy, helps us grow, and keeps us strong and healthy.</p> <p>Teacher, humans need shelter to stay safe. Shelter protects us from rain, cold, heat, and danger.</p> <p>We need to protect water, food, air, and shelter because we need them to live. If we waste them or make them dirty, there might not be enough for everyone. Saving them helps people, animals, and the Earth stay healthy.</p>
--	--	---	---

I will group you into four through counting. You will all be given the same pair of pictures and I want you to identify which among the two we need and we should avoid, briefly present your output as a group in front of the class. Paste your answer using this column:

WHAT WE NEED:	WHAT WE SHOULD AVOID:

1.



2.



3.





4.



You were all able to identify the issues from these pictures. Brilliant!

EXAMPLE:

WHAT WE NEED:	WHAT WE SHOULD AVOID:
	

		<p>Now, have you experienced these issues within your community?</p> <p>Can you please specify which issue?</p> <p>Now, grab a ¼ sheet of paper and answer the following questions.</p> <p>Question: How do these issues affect you, your family, and your community?</p> <p>A. These issues can make people sick.</p> <p>B. These issues can make people healthy.</p> <p>Question: How do you, your family, and your community responds from these issues?</p> <p>A. We try to save water, keep the air clean, and not waste food.</p> <p>B. We waste water, burn trashes, and trees.</p>	<p>Yes, Teacher!</p> <p>Teacher, we have experienced all of these issues within our community.</p>
--	--	--	--

Student Teacher: Zuhara M. Tampogao **Date:** July 29, 2025
Name of Cooperating Teacher: Junaida O. Dimaporo
Subject Taught: Science 3
Subject Matter: Basic Needs of Living Things i.e. humans (air, food, water, and shelter)
School: Sultan Naga Dimaporo - Memorial Integrated School

A DETAILED 5-DAY LESSON PLAN IN SCIENCE III (DAY 2)

I. OBJECTIVES

After the lesson, students should be able to:

- a. identify potential solutions to the issues related to water;
- b. present their proposed solution regarding to the issues related to water; and
- c. recognize that there is a need to solve these issues

II. SUBJECT MATTER

A. Topic: Basic Needs of Living Things i.e. Humans (air, food, water, and shelter)

B. Reference:

1. Department of Education (DepEd). 2016. K to 12 Curriculum Guide SCIENCE [Curriculum Guide].
2. Glenn, E. (n.d.). *LP Basic needs of living things*. Scribd.
<https://www.scribd.com./documents/819079060/Lp-Basic-Needs-of-living-things>

C. Materials: Visual Aids, TV, and PPT presentation

D. Teaching Strategy: Inquiry Method

E. Learning Model: 5E Model (Engage, Explore, Explain, Elaborate, and Evaluate)

F. Teaching Approach: STEM Approach (Science, Technology, Engineering, and Mathematics)

III. LEARNING PROCEDURE

5E PHASE	STEM STAGE	TEACHER'S ACTIVITY	STUDENTS' ACTIVITY
Explore	Identificat ion of Potential Solutions	Anyone from the class who can give us a recap of what we discussed or did yesterday?	Teacher, yesterday we identified the

		<p>Excellent! Now, we will forward to new activities related to what we did yesterday.</p> <p>I will group you into two groups through counting. Each group will be given issue to focus on what results to contaminated water and will discuss strategies to solve the problem. There should be a group presentation of your output.</p> <p>GROUP 1: Flooding GROUP 2: Garbages to water sources.</p> <p>Pupils may consider the following strategies in solving the issues given:</p> <p>Human capital: Brainstorm ideas on how to solve the problem based on their prior knowledge and experiences in their community.</p> <p>Social/Technologies: Make a poster slogan encouraging</p>	<p>different issues in our community affecting our basic human needs, such as air, water, food, and shelter, through various activities like watching videos, and how we can respond to these issues.</p> <p>(Pupils do as told)</p>
--	--	--	--

		<p>everyone to keep water in the community safe and clean.</p> <p>Physical capital: Build simple water filters using gravel, sand, and bottles.</p> <p>Financial capital: Use recycled or low-cost materials for their projects.</p> <p>Natural capital: Use local and recyclable materials like plastic bottles, and cottons in designing their water filters.</p>	<p>POSSIBLE OUTPUTS:</p> <p>GROUP 1: Problem: Water gets contaminated due to flooding.</p> <p>Solution:</p> <ol style="list-style-type: none"> 1. Design a DIY water filter. <p>GROUP 2: Problem: Garbage to water sources.</p> <p>Solution: Make a poster slogan that encourages:</p> <ol style="list-style-type: none"> 1. Refraining from throwing garbage into the water. 2. Joining clean-up
--	--	--	--

		<p>Now, present your answer.</p> <p>Children, good job on developing potential solutions to these problems. But I have a few questions before we end our class.</p> <p>Ask: How can these solutions you identified help your family and your community?</p> <p>Ask: How are you going to make these solutions possible?</p>	<p>drives to clean rivers or beaches.</p> <p>3. Use water wisely and don't waste it.</p> <p>(Pupils do as told)</p> <p>These things help my family and community stay healthy and strong. Clean water is good for drinking and washing. If we take care of the environment, it will keep giving us what we need.</p> <p>I can help by not throwing trash on the ground, saving water, and planting trees. I can tell my family and friends to take care of nature too. When we all help the environment, we</p>
--	--	---	---

		<p>Ask: Why is there a need to solve these issues?</p>	<p>can keep getting water.</p> <p>We need to solve these problems so we can stay healthy and safe. If there is no clean water, people and animals can't live well. If we hurt the environment, we might lose our homes. Taking care of nature helps everyone live a better life.</p>
--	--	---	--

Student Teacher: Zuhara M. Tampogao **Date:** July 30, 2025
Name of Cooperating Teacher: Junaida O. Dimaporo
Subject Taught: Science 3
Subject Matter: Basic Needs of Living Things, i.e., humans (air, food, water, and shelter)
School: Sultan Naga Dimaporo - Memorial Integrated School

A DETAILED 5-DAY LESSON PLAN IN SCIENCE III (DAY 3)

I. OBJECTIVES

After the lesson, students should be able to:

- a. determine the things to do to solve problems related to water, and its positive impact, and things not to do then its negative impact on water sources;
- b. design a mini-project to solve issues related to water; and
- c. recognize that there is a need to conserve this necessity

II. SUBJECT MATTER

A. Topic: Basic Needs of Living Things i.e. Humans (air, food, water, and shelter)

B. Reference:

1. Department of Education (DepEd). 2016. K to 12 Curriculum Guide SCIENCE [Curriculum Guide].
2. Glenn, E. (n.d.). *LP Basic needs of living things*. Scribd. <https://www.scribd.com./documents/819079060/Lp-Basic-Needs-of-living-things>

C. Materials: Visual Aids, TV, and PPT presentation




D. Teaching Strategy: Inquiry Method

E. Learning Model: 5E Model (Engage, Explore, Explain, Elaborate, and Evaluate)

F. Teaching Approach: STEM Approach (Science, Technology, Engineering, and Mathematics)

III. LEARNING PROCEDURE

5E PHASE	STEM STAGE	TEACHER'S ACTIVITY	STUDENTS' ACTIVITY
Explain	Need for Knowledge	Anyone from the class who can give us a recap of what we discussed or did yesterday?	

		<p>That's right.</p> <p>Now, we will move on to a new activity.</p> <p>Activity: Group reporting</p> <p>The teacher will show pictures illustrating the importance of water to humans by showing real-life examples, like water scarcity.</p>   	<p>Teacher, yesterday you grouped us into four and gave each group an issue to focus on and discuss, and a possible solution to.</p>
--	--	---	--



(Teacher shows a video about a water filter) Retrieved from:

<https://youtu.com/shorts/Raa5pDMgFqA?si=z0djaS8GSCsfo>

Lm

With the same group members from the previous grouping, each group will answer the following in a manila paper in relation to the picture shown:

1. What are the **main problems** related to this need?
 - 1.
 - 2.
2. Who is **most affected**?
 - 1.
 - 2.
3. What are the **causes** of the problem?
 - 1.
 - 2.
4. What are some **current solutions**, and are they effective?
 - 1.
 - 2.

(Pupils do as told)

		Each group will then present its output.	
	Decision-making	<p>Now, with the same group, design a mini-project that you can use to address the issue you were assigned to. You may use your strategies from our previous lesson in developing your project.</p> <p>When you are done, present your design and discuss how your product will be used and how the people in the community will benefit from it.</p> <p>Examples:</p> <p>Water: Create a mini water filter.</p>	(Pupils do as told)

Student Teacher: Zuhara M. Tampogao **Date:** July 31, 2025
Name of Cooperating Teacher: Junaida O. Dimaporo
Subject Taught: Science 3
Subject Matter: Basic Needs of Living Things, i.e., humans (air, food, water, and shelter)
School: Sultan Naga Dimaporo - Memorial Integrated School

A DETAILED 5-DAY LESSON PLAN IN SCIENCE III (DAY 4)

I. OBJECTIVES

After the lesson, students should be able to:

- a. identify specific roles within their group to efficiently develop the prototype;
- b. develop a prototype that can solve issues related to water; and
- c. recognize the contribution of their prototype in solving or minimizing the issue within their community.

II. SUBJECT MATTER

A. Topic: Basic Needs of Living Things, i.e., Humans (air, food, water, and shelter)

B. Reference:

1. Department of Education (DepEd). 2016. K to 12 Curriculum Guide SCIENCE [Curriculum Guide].
2. Glenn, E. (n.d.). *LP Basic needs of living things*. Scribd.
<https://www.scribd.com./documents/819079060/Lp-Basic-Needs-of-living-things>

C. Materials: Visual Aids, TV, PPT presentation, and Local Materials

D. Teaching Strategy: Inquiry Method

E. Learning Model: 5E Model (Engage, Explore, Explain, Elaborate, and Evaluate)

F. Teaching Approach: STEM Approach (Science, Technology, Engineering and Mathematics)

III. LEARNING PROCEDURE

5E PHASE	STEM STAGE	TEACHER'S ACTIVITY	STUDENTS' ACTIVITY
Elaborate	Development of	Anyone from the class who can give us a recap of what we discussed or did yesterday?	

		to solving or minimizing the issue in your community.	
--	--	--	--

Student Teacher: Zuhara M. Tampogao **Date:** August 1, 2025
Name of Cooperating Teacher: Junaida O. Dimaporo
Subject Taught: Science 3
Subject Matter: Basic Needs of Living Things, i.e., humans (air, food, water, and shelter)
School: Sultan Naga Dimaporo - Memorial Integrated School

A DETAILED 5-DAY LESSON PLAN IN SCIENCE III (DAY 5)

I. OBJECTIVES

After the lesson, pupils should be able to:

- a. Identify mini-projects that can solve the issues related to water
- b. upload a promotional video about the conservation of this basic need; and
- c. recognize how this need, as part of the environment important to us.

II. SUBJECT MATTER

A. Topic: Basic Needs of Living Things, i.e., Humans (air, food, water, and shelter)

B. Reference:

1. Department of Education (DepEd). 2016. K to 12 Curriculum Guide SCIENCE [Curriculum Guide].
2. Glenn, E. (n.d.). *LP Basic needs of living things*. Scribd.
<https://www.scribd.com./documents/819079060/Lp-Basic-Needs-of-living-things>

C. Materials: Visual Aids, TV, PPT presentation, and Local Materials

D. Teaching Strategy: Inquiry Method

E. Learning Model: 5E Model (Engage, Explore, Explain, Elaborate, and Evaluate)

F. Teaching Approach: STEM Approach (Science, Technology, Engineering, and Mathematics)

III. LEARNING PROCEDURE

5E PHASE	STEM STAGE	TEACHER'S ACTIVITY	STUDENTS' ACTIVITY
Evaluate	Test and evaluation	Anyone from the class who can give us a recap of what we discussed or did yesterday?	

	<p>of the solution</p>	<p>That's right! This morning, I am going to evaluate your output from yesterday using a rubric.</p> <p>Activity: Group Presentation Pupils will present their mini water filter to the class.</p> <p>Each group will explain how the filter was made, how it works, and what results they observed when they tested it.</p> <p>(Presentation time)</p>	<p>Teacher, yesterday we developed a mini-project that can solve the issue that we were assigned to as a group.</p> <p>(Pupils do as told)</p>
	<p>Socialization and completion decision stage</p>	<p>Now, I want you to present your outputs.</p> <p>Pupils will exhibit their water filter through a bazaar activity and invite people to see and learn from it. Each group may prepare its own "fun facts" about its product or activity to gain support.</p> <p>The visitors will be given a "star" sticker when they enter the venue. Visitors will roam around to see and evaluate the</p>	<p>(Pupils do as told)</p>

		products of each group. When they leave, they will have to stick their stickers on the column of the group they've chosen. Each “ star ” sticker corresponds to one point.	
--	--	---	--

Rubric for the Prototype:

Criteria	4 – Excellent	3 – Good	2 – Satisfactory	1 – Needs Improvements
1. Creativity and Relevance	Highly creative and directly addresses the issue with an innovative solution.	Creative and mostly relevant to the issue	Some creativity shown; partiality related to the issue	Lacks creativity; not clearly connected to the issue
2. Use of Local, Recyclable, and Affordable Materials	All materials are local, recyclable, and affordable; chosen effectively for the purpose.	Most materials used are local/affordable, and recyclable	Some effort to use local materials; not always suitable	Little or no use of local, affordable, and recyclable materials
3. Teamwork and Presentation	The group worked cooperatively; presented clearly with a full explanation of the process and purpose.	Good teamwork; the presentation was mostly clear and organized	Uneven participation; explanation lacked clarity or details	Poor teamwork; unclear or missing explanation

APPENDIX G**Test questionnaire for post-test**

Name: _____
Age: _____ Date: _____
Gender: Male female

Test I. Multiple Choice

INSTRUCTION: Read each question carefully. Encircle the letter of the correct answer.

1. **What should you do if your friend drinks water from a dirty puddle?**
 - A. Do nothing
 - B. Say it's okay
 - C. Give clean water and explain why
 - D. Drink it too
2. **What happens when you eat healthy food?**
 - A. You feel sleepy
 - B. You get sick
 - C. You grow strong
 - D. You lose energy
3. **What do we breathe in to stay alive?**
 - A. Smoke
 - B. Oxygen
 - C. Nitrogen
 - D. Carbon dioxide
4. **Why do plants need water?**
 - A. To play in the mud
 - B. To grow
 - C. To clean the pot
 - D. To fill the garden
5. **What would you do if your friend wanted to waste water, but you knew it was wrong?**
 - A. Help them waste more water
 - B. Tell them it's okay

C. Talk to them about saving water

D. Laugh and walk away

6. What does food give our bodies?

A. Water

B. Toys

C. Dirt

D. Energy

7. Why do we need a house?

A. To watch TV

B. To stay safe and warm

C. To play inside

D. To eat food

8. Why do we eat food every day?

A. To grow strong

B. To sleep more

C. To play

D. To make friends

9. Why do we need water?

A. To write

B. To watch TV

C. To sleep

D. To stay healthy

10. How can you save water at home?

A. Take long baths

B. Let taps run

C. Take short showers

D. Play with water

11. Why should we not waste water?

A. It is free

B. We need it to live

C. It makes us wet

D. It's hard to find

12. How can we help take care of the Earth?

A. Plant trees and throw trash properly

B. Burn trash

- C. Throw trash in rivers
 - D. Use cars for short trips
13. **When can food become dirty or unsafe?**
- A. When flies land on it
 - B. When it's cooked well
 - C. When it's covered
 - D. When it's in the fridge
14. **What can make the air dirty?**
- A. Planting trees
 - B. Walking to school
 - C. Riding a bike
 - D. Burning trash
15. **What is the best way to keep your school clean with your classmates?**
- A. Throw trash behind the classroom
 - B. Wait for the teacher to clean everything
 - C. Make a cleaning schedule and work together
 - D. Tell others not to clean
16. **How can we build a home that helps the Earth?**
- A. Use solar panels and grow plants
 - B. Use lots of plastic
 - C. Make it loud and dirty
 - D. Leave the roof leaking
17. **How can we help other people?**
- A. Ignore them
 - B. Break their homes
 - C. Help build safe homes
 - D. Push them away
18. **What does a house protect us from?**
- A. Books
 - B. Heat, cold, and rain
 - C. Chairs
 - D. Toys
19. **What should you do if someone throws trash on the ground?**
- A. Throw more trash
 - B. Walk away

C. Tell an adult or pick it up

D. Laugh at them

20. **What is a good habit at home?**

A. Wasting water

B. Using water wisely

C. Washing cars daily

D. Playing with water

APPENDIX H

Survey questionnaire

Investigating the Effectiveness of the 5E Lesson Plan in Localized Context-Based STEM Approach in Teaching Science 3

Instructions: Please put a ✓ check mark on the number that best shows how often you felt or did the things below during your Science lessons with the new activities.

Rating Scale Response Option

- 3 - Always
 2 - Sometimes
 1 - Never

INDICATORS	1	2	3
1. I enjoyed the Science lessons that used local stories or examples.			
2. The hands-on activities helped me understand Science better.			
3. I felt excited to join group work and experiments during the Science lessons.			
4. The lessons made me curious and ask more questions about Science.			
5. I was able to focus and pay attention during the whole Science lesson.			
6. I liked using things from our community or environment in our Science activities.			

7. I shared my ideas and helped my classmates during Science activities.			
8. The steps of the lesson (Explore, Explain, etc.) helped me learn Science well.			
9. I felt confident to do the experiments or activities by myself.			
10. I look forward to Science lessons like this again.			

APPENDIX I**Answer Key****PRE-TEST**

1. A.
2. A.
3. A.
4. C.
5. D.
6. C.
7. B.
8. B.
9. A.
10. A.
11. D.
12. C.
13. D.
14. B.
15. C.
16. A.
17. B.
18. C.
19. C.
20. B.

POST-TEST

1. C.
2. C.
3. B.
4. B.
5. C.
6. D.
7. B.
8. A.
9. D.
10. C.
11. B.
12. A.
13. A.
14. D.
15. C.
16. A.
17. C.
18. B.
19. C.
20. B.

APPENDIX J

TABLE OF SPECIFICATION (TOS)

SUBJECT: Science

SCHOOL YEAR: 2025-2026

YEAR LEVEL AND SECTIONS: Grade 3

QUARTER: 2nd Quarter

Learning Competencies	No. of days/hours	Items Numbers	1 point each item (Multiple Choice)			SCORING SYSTEM	
			REMEMBERING/UNDERSTANDING	APPLYING/ANALYZING	EVALUATING/CREATING	No. of Test Items	Percentage %
Identify the needs of living things i.e. humans' such as air, food, water, and shelter	5		EASY 60%	AVERAGE 30%	DIFFICULT 10%		
		1, 2, 3,4, 6, 7,8,9,11, 18, 20	11	0	0	11	55%
		5,10, 13, 14, 15,19	0	6	0	6	30%
		12, 16, 17	0	0	3	3	15%
TOTAL:	5		11	6	3	20	100%

Prepared and submitted by:

Approved for administration by:

ZUHARA M. TAMPOGAO

Researcher

LIEZEL P. NAQUINES, MSciED

Chairperson, College of Education

NAMILA L. MACAGAAN

Researcher

APPENDIX K

DOCUMENTATION DURING THE CONDUCT OF THE STUDY



