

# Bridging Literacy and Scientific Learning: Teachers' Narratives in Enhancing Learners' Reading Comprehension of Science Concepts

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Publication Date: 2026/06/15

**Abstract:** This study explored the lived experiences and narratives of teachers in enhancing learners' reading comprehension of science concepts through literacy-integrated instructional practices. It aimed to examine the strategies, challenges, and insights of teachers in addressing learners' difficulties in understanding scientific texts and terminologies. Using a qualitative research design, specifically narrative inquiry, data were gathered through in-depth interviews and reflective accounts from selected Science teachers teaching in Intermediate level grades 4-6 in Tupi, South District, Division of South Cotabato. The findings revealed that teachers employed various literacy-based approaches such as contextualized reading activities, vocabulary scaffolding, guided questioning, collaborative learning, and the integration of visual and experiential learning materials to improve comprehension of science concepts. Teachers also highlighted challenges including limited reading proficiency, lack of learner motivation, insufficient instructional resources, and time constraints. Despite these difficulties, the narratives demonstrated teachers' commitment and adaptability in creating learner-centered strategies that promote both scientific understanding and literacy development. The study underscores the importance of integrating literacy instruction into science education to strengthen learners' comprehension, critical thinking, and academic performance. Furthermore, the findings suggest the need for continuous teacher training, curriculum support, and the development of interdisciplinary approaches that connect reading literacy with scientific learning.

**Keywords:** *Literacy-Integrated, Contextualized Reading, Reading Proficiency, Literacy Instruction, Critical Thinking.*

**How to Cite:** Mayani S. Paguidian (2026) Bridging Literacy and Scientific Learning: Teachers' Narratives in Enhancing Learners' Reading Comprehension of Science Concepts. *International Journal of Innovative Science and Research Technology*, 11(6), 284-294. <https://doi.org/10.38124/ijisrt/26jun245>

## I. INTRODUCTION

Many learners struggled to understand Science concepts due to limited reading comprehension skills, which hinder their ability to analyze texts, interpret data, and grasp scientific ideas. Since Science learning heavily depends on reading and understanding informational texts, teachers play a vital role in helping learners' bridge the gap between literacy and scientific understanding. Integrating reading comprehension strategies into Science instruction not only improves learners' ability to decode scientific language but also deepens their conceptual understanding and critical thinking. This study is conducted to explore the lived experiences of teachers in enhancing learners' reading comprehension of Science concepts, highlighting the strategies they employ, the challenges they face, and the insights they gain in promoting literacy as a foundation for meaningful scientific learning.

Globally, educators recognized that reading comprehension is essential to students' understanding of scientific concepts, as Science learning requires interpreting

texts, analyzing data, and constructing meaning from informational materials. In China, Xie et al. (2023) emphasized that developing metacognitive reading strategies enhances students' scientific literacy by allowing them to process complex information and apply it in problem-solving. Similarly, Esparza et al. (2023) from the United States highlighted that integrating literacy instruction into Science promotes deeper conceptual understanding, especially when teachers scaffold reading activities that connect vocabulary, inquiry, and comprehension. These perspectives demonstrate that reading comprehension is not just a literacy skill but a critical component of meaningful scientific learning across global contexts.

In many educational systems, the alignment of literacy and Science instruction has become a key focus for improving student outcomes and fostering 21st-century competencies. Australian educators, according to Larkin et al. (2023), emphasized the importance of equipping teachers with pedagogical tools that support students in reading and interpreting scientific texts effectively. Meanwhile, Xie et al. (2023) in China pointed out that enhancing students' self-

efficacy in reading contributes significantly to their success in understanding scientific ideas. These global insights underline a shared educational challenge: teachers must bridge the gap between literacy and Science learning to help students move beyond rote knowledge and toward conceptual and analytical thinking.

In the Philippines, low reading comprehension remains a significant barrier to learning not only in language classes but also in content areas such as Science. For example, in Malita, Davao Occidental, Dawang, De Arce, and Franca (2025) observed that intermediate pupils exhibit high levels of frustration when reading texts, often unable to independently understand content, which suggests reading comprehension deficits that may hinder comprehension of scientific and other subject-matter passages. In response, national agencies such as DepEd are pushing for a science-based approach to literacy in locales like Sta. Rosa City, Laguna, reflecting concern that weak reading skills undermine performance in international benchmarks, notably in Science literacy.

Teachers' instructional practices, resource allocation, and systemic support also play a role in how well learners develop reading comprehension of Science concepts in the intermediate grades. In Calamba City, Caraig and Quimbo (2024) assessed reading comprehension difficulties in core Science subjects among senior high school students and identified factors such as unfamiliar vocabulary, poorly scaffolded texts, and a lack of teacher-prepared interventions as major impediments to comprehension. Additionally, Lagdaan and Sevilla (2025) in Bicol Region synthesized research on reading comprehension strategies among Junior High School students and found that interventions like graphic organizers, guided reading, and reciprocal teaching show promise, but their effectiveness is inconsistent where teachers lack training, schools lack materials, or socio-cultural and technological supports are weak.

As a Science teacher in the Tupi South District, Division of South Cotabato, the researcher has observed that many intermediate grade learners struggle to comprehend Science concepts due to weak reading comprehension skills. This persistent difficulty has prompted the researcher to conduct the present study to explore how teachers enhance learners' reading comprehension of Science concepts through various strategies and instructional practices. The study is relevant as it seeks to provide valuable insights that can inform teaching approaches not only within the district but also in similar educational contexts, thereby supporting the Department of Education's goal of improving both literacy and scientific literacy among Filipino learners.

## II. METHOD

The present study employed a qualitative phenomenological research design to explore and understand the lived experiences of Science teachers in enhancing learners' reading comprehension of scientific concepts. This research design was deemed appropriate because phenomenology seeks to uncover the meanings, perceptions,

and experiences of individuals regarding a particular phenomenon. Specifically, the study aimed to examine how Science teachers navigate the challenges of integrating literacy instruction into Science teaching and how they develop strategies to improve learners' comprehension of scientific texts and concepts. Through this approach, the researcher was able to gain a deeper understanding of the participants' experiences and the essence of the phenomenon under investigation.

To achieve the objectives of the study, seven (7) Science teachers teaching at the intermediate grade level (Grades 4, 5, and 6) within the Tupi South District under the Schools Division of South Cotabato were selected as participants. In particular, the study employed purposive sampling, a non-probability sampling technique commonly utilized in qualitative research to identify individuals who possess relevant knowledge and experience related to the phenomenon being explored. Consequently, the participants were intentionally selected based on their experience in teaching Science and implementing literacy-based instructional strategies. As a result, they were able to provide rich, detailed, and meaningful narratives regarding their practices, challenges, and coping mechanisms in enhancing learners' reading comprehension of Science concepts. Moreover, the sample size of seven participants was considered sufficient to achieve data saturation while maintaining the depth and richness required in phenomenological inquiry.

Furthermore, to enhance the credibility and trustworthiness of the findings, environmental triangulation was employed throughout the study. Specifically, the participants were drawn from small, medium, and large schools within the Tupi South District to ensure representation from diverse educational settings. By incorporating teachers from different school contexts, the study captured variations in classroom environments, instructional resources, learner characteristics, and teaching conditions. In addition, examining the experiences of teachers across varied contexts enabled the researcher to identify both common patterns and contextual differences in their strategies, challenges, and coping mechanisms. Consequently, this approach enriched the interpretation of the findings and contributed to a more comprehensive and contextually grounded understanding of teaching practices related to reading comprehension in Science.

With regard to data collection, in-depth interviews served as the primary research instrument of the study. This method was chosen because it allows participants to articulate their experiences, perspectives, and insights in their own words, thereby generating rich and nuanced data. Moreover, the flexibility of in-depth interviews enabled the researcher to ask follow-up questions, seek clarifications, and further explore emerging themes that surfaced during the interview process. As such, the use of this instrument facilitated a more comprehensive understanding of the instructional practices, challenges, coping strategies, and reflections of Science teachers concerning learners' reading comprehension of scientific concepts.

Equally important, ethical principles and research protocols were strictly observed throughout the conduct of the study to ensure that the research process was carried out with integrity, respect, and fairness. Prior to data collection, participants were fully informed about the purpose of the study, the nature of their involvement, and their rights as research participants. Subsequently, informed consent was obtained from each participant, while confidentiality and anonymity were maintained throughout the research process. Furthermore, participants were assured that their responses would be used solely for academic purposes and that they could withdraw from the study at any point without penalty. Therefore, these ethical safeguards protected the rights, dignity, and well-being of the participants while fostering an atmosphere of trust and openness during data collection.

Finally, the collected data were analyzed to capture and interpret the essence of the participants' lived experiences in enhancing learners' reading comprehension of Science concepts. To accomplish this, interview transcripts were carefully reviewed, organized, and examined using thematic analysis, a systematic method for identifying, analyzing, and reporting patterns within qualitative data. Initially, the researcher familiarized themselves with the data through repeated reading of the transcripts. Thereafter, significant statements were coded, categorized, and organized into meaningful themes and subthemes. Through this analytical process, the study uncovered valuable insights into the instructional practices, challenges encountered, coping mechanisms employed, and recommendations shared by the participants. Ultimately, thematic analysis provided a deeper understanding of how Science teachers address reading comprehension challenges and offered a meaningful framework for interpreting the complexities of literacy integration within Science instruction.

### III. RESULTS AND DISCUSSIONS

Teachers navigate the complexity of scientific texts by employing structured reading strategies, vocabulary scaffolding, guided questioning, and the use of visual and contextual supports to make abstract concepts more accessible. Their experiences highlight the importance of adapting instruction to diverse learner needs, particularly in addressing varying reading abilities and levels of engagement in the classroom. Below are the themes, sub-themes and significant statements that describe the teachers' experiences.

#### ➤ *Integration of Structured Reading Strategies in Science Instruction*

This theme showed how teachers intentionally embed reading processes within their Science teaching to support learners' comprehension of complex concepts. The participants' narratives reveal that teachers do not treat reading as a separate skill but rather as an integral part of learning Science. The following are the sub-themes for this study. According to Gray et al. (2021), integrating reading strategies into Science lessons enables learners to extract main ideas, summarize information, and connect theoretical concepts with observable phenomena, ultimately improving comprehension and retention.

#### • *Pre-, During-, and Post-Reading Strategies*

The findings of the study reveal that teachers consistently employ pre-, during-, and post-reading strategies as a structured approach to enhance learners' comprehension of Science concepts across diverse school environments. Through these staged reading practices, teachers systematically prepare learners before reading, actively support comprehension during reading, and reinforce understanding after reading, thereby facilitating deeper engagement with scientific texts and concepts. This intentional integration of literacy within Science instruction aligns with the findings of Gray et al. (2021), who emphasized that embedding structured reading routines in content-area teaching strengthens learners' ability to construct meaning, make connections among ideas, and comprehend complex information. The triangulation of perspectives from large, medium, and small school settings further demonstrates a shared commitment among teachers to using structured reading instruction as a means of supporting learners' understanding of Science concepts. Although the implementation of these strategies varies according to contextual factors such as available resources, learner characteristics, and classroom conditions, the underlying goal remains consistent: to guide learners through a systematic process of meaning-making. This finding supports Hwang (2021), who asserted that integrated literacy practices create meaningful learning opportunities that simultaneously enhance reading comprehension and content mastery. Overall, the findings suggest that structured reading strategies are widely valued and effectively utilized across different school environments, underscoring their importance in promoting literacy development and conceptual understanding in Science education.

#### • *Think-Aloud and Guided Reading*

The findings of the study indicate that graphic organizers and simplified explanations are essential strategies used by teachers to support learners' understanding of complex Science concepts across different school environments. Participants' responses show that teachers in larger school settings emphasize visual and structured representations to make abstract concepts more accessible. This finding is further supported by Duke (2021), who emphasizes that comprehension depends on both vocabulary and domain knowledge, requiring teachers to scaffold understanding through supportive strategies. Similarly, Cervetti (2020) highlights that knowledge-rich approaches, including the use of structured supports and simplified instruction, enhance learners' ability to synthesize and understand complex texts. The triangulation of perspectives across different school environments demonstrates that while the tools and methods may vary, the use of graphic organizers and simplified explanations remains a shared and effective practice in enhancing learners' reading comprehension of Science concepts. The triangulation of perspectives across school environments reveals both consistency in the use of guided reading and variation in its implementation, highlighting that while teachers universally recognize the importance of modeling comprehension, their approaches are shaped by contextual realities and available instructional support.

- *Collaborative, Hands-On, and Multimedia Approaches*

The findings of the study reveal that collaborative, hands-on, and multimedia approaches are essential instructional practices that support learners' comprehension of Science concepts across different school environments. Across all school contexts, teachers consistently employ interactive and experiential strategies to actively engage learners and deepen their understanding of scientific concepts. Despite this shared emphasis, variations emerge in the implementation of these approaches. Teachers in large schools tend to focus more on structured collaborative strategies, such as peer tutoring and group work, reflecting their capacity to utilize more organized classroom systems. In contrast, teachers in medium-sized schools emphasize hands-on activities and the use of concrete materials, suggesting a reliance on experiential learning to support learners' understanding of scientific texts and concepts. Meanwhile, teachers in small schools integrate multimedia resources and real-life connections, demonstrating flexibility and creativity in engaging learners despite resource limitations. These variations indicate that while teachers universally value interactive and experiential learning, their instructional approaches are shaped by the contextual realities of their school environments. Gillis and Gunning (2022) emphasize that collaborative learning enhances comprehension through dialogue, interaction, and shared meaning-making among learners. The triangulation of perspectives across different school settings demonstrates both convergence in the use of interactive instructional strategies and divergence in their application, reinforcing that collaborative, hands-on, and multimedia approaches are vital and context-responsive practices for enhancing learners' reading comprehension of Science concepts.

- *Scaffolding Vocabulary and Supporting Learners' Meaning-Making*

This theme highlights how teachers intentionally support learners in understanding complex scientific terms and concepts by making them more accessible and meaningful. The findings of the study reveal that teachers employ various scaffolding strategies, including pre-teaching vocabulary, utilizing context clues, translating unfamiliar terms into familiar language, and providing simplified explanations to enhance comprehension. These instructional practices help learners connect new scientific vocabulary to their prior knowledge and experiences, thereby facilitating deeper understanding and more meaningful engagement with scientific texts. The findings further suggest that teachers recognize vocabulary development as a critical foundation for reading comprehension in Science, as learners often struggle to interpret scientific concepts when unfamiliar terminology becomes a barrier to understanding. Consequently, scaffolding vocabulary and meaning-making emerges as an essential instructional approach that supports learners in constructing knowledge and comprehending complex scientific content. The specific dimensions of this theme are further discussed in the sub-themes presented below.

- *Unlocking Difficult Vocabulary*

This sub-theme reveals that unlocking difficult vocabulary is a critical strategy employed by teachers to support learners' comprehension of Science concepts across different school environments. Participants' responses indicate that teachers, particularly those in large school settings, intentionally address unfamiliar scientific terms before engaging learners in deeper conceptual discussions. Across all contexts, teachers demonstrate a shared understanding that vocabulary development serves as a foundational element in helping learners access, interpret, and make sense of scientific texts. Despite this common emphasis, variations emerge in the ways teachers implement vocabulary instruction, reflecting differences in learner needs, instructional contexts, and available resources. Some teachers rely on direct vocabulary instruction and word unlocking activities, while others incorporate contextualized explanations and language support strategies to facilitate understanding. These variations suggest that although vocabulary development is universally prioritized, instructional approaches are shaped by the unique realities of each school environment. This finding is supported by recent research, as Snow (2021) emphasizes that explicit vocabulary instruction significantly enhances learners' comprehension and ability to use disciplinary language effectively. The triangulation of perspectives across different school environments reveals both consistency in recognizing vocabulary as a key challenge and variation in the strategies used to address it, reinforcing that unlocking difficult vocabulary is a fundamental yet context-responsive practice in enhancing learners' reading comprehension of Science concepts.

- *Use of Context Clues and Translation*

This sub-theme highlights the use of context clues and translation as significant strategies employed by teachers to support learners' understanding of scientific vocabulary and concepts across different school environments. Participants' responses reveal that teachers consistently assist learners in interpreting unfamiliar terms by connecting new vocabulary to known language, prior knowledge, and contextual information within the text. These strategies help learners construct meaning from scientific texts and reduce the barriers posed by complex or unfamiliar terminology. Across all school contexts, teachers recognize the value of guiding learners toward understanding vocabulary through contextual analysis and language support rather than relying solely on memorization. Despite this shared practice, variations emerge in the emphasis placed on each strategy, reflecting differences in learners' language proficiency, reading abilities, and classroom conditions. These variations suggest that while context clues and translation are widely recognized as effective tools for enhancing comprehension, their implementation is shaped by the specific needs and realities of each learning environment. This finding is supported by research, as Lesaux and Kieffer (2020) emphasize that leveraging linguistic resources such as translation and contextual analysis enhances vocabulary acquisition and reading comprehension, particularly among learners with limited language proficiency. Similarly, Nagy and Townsend (2020) highlight that teaching students to use context clues

strengthens their ability to independently infer word meanings and improve comprehension of complex texts. The triangulation of perspectives across different school environments demonstrates both convergence in recognizing the importance of these strategies and divergence in their application, reinforcing that context clues and translation are essential, context-responsive practices in enhancing learners' reading comprehension of Science concepts.

- *Graphic Organizers and Simplified Explanations*

On this sub-theme, the findings of the study indicate that graphic organizers and simplified explanations are widely utilized by teachers to support learners' meaning-making and comprehension of Science concepts across different school environments. In large schools (Participants 1, 2, and 3), teachers employ structured visual tools to organize information, highlight relationships among concepts, and clarify complex scientific ideas. In medium schools (Participants 4 and 5), teachers place greater emphasis on simplifying explanations and breaking down content into manageable parts that align with learners' comprehension levels. Meanwhile, in small schools (Participants 6 and 7), teachers integrate informal visualization techniques and contextual supports to make scientific concepts more accessible and relevant to learners. Across all contexts, teachers consistently use visual and simplified instructional strategies to reduce the complexity of scientific content and facilitate understanding. Despite this shared practice, differences are evident in the formality, scope, and application of these strategies, reflecting variations in classroom contexts, learner needs, and available instructional resources. These differences suggest that while teachers share the common goal of organizing and simplifying information to support comprehension, the methods they employ are shaped by contextual realities. This finding is supported by Duke (2021), who emphasizes that comprehension depends on both vocabulary and domain knowledge, requiring instructional supports that help learners effectively organize, process, and integrate information. The triangulation of perspectives across school environments demonstrates both convergence in recognizing the value of graphic organizers and simplified explanations and divergence in their implementation, reinforcing that these strategies are essential and context-responsive tools for enhancing learners' reading comprehension of Science concepts.

- *Enhancing Learners' Reading Comprehension Challenges*

The main theme, Challenges in Enhancing Learners' Reading Comprehension in Science, highlights the multifaceted difficulties teachers encounter in supporting learners' understanding of scientific texts and concepts. The findings of the study reveal that learners commonly struggle with limited vocabulary, complex scientific language, and difficulties in processing informational texts, all of which hinder their ability to construct meaningful understanding from what they read. Scientific texts are often characterized by dense content, unfamiliar terminology, technical language, and abstract concepts that require both linguistic proficiency and cognitive readiness for effective comprehension. Consequently, many learners experience

difficulty interpreting scientific information, making connections among ideas, and applying newly acquired knowledge. These challenges often result in reduced engagement, particularly when learners are confronted with unfamiliar words or lengthy passages that exceed their reading abilities. As a result, learners may rely on surface-level understanding or memorization rather than developing deeper conceptual comprehension. The findings underscore the significant role of reading comprehension in Science learning and highlight the need for targeted instructional support to help learners navigate the linguistic and cognitive demands of scientific texts. The specific dimensions of these challenges are further discussed in the sub-themes presented below.

- *Limited Vocabulary and Comprehension Skills*

This theme shows that Limited Vocabulary and Comprehension Skills is a major barrier in enhancing learners' reading comprehension of Science concepts across different school environments. These responses of participants indicate that even in more resource-equipped settings, vocabulary gaps significantly affect comprehension. Across all school contexts, teachers consistently identify vocabulary limitations as a core issue that hinders learners' ability to understand and interpret scientific texts. Despite this shared concern, variations emerge in how the challenge manifests across school environments. Teachers in large schools focus on learners' difficulty in grasping technical terms within complex texts, while medium school teachers highlight the gap between decoding and actual comprehension. In contrast, small school teachers emphasize both vocabulary limitations and learners' struggle to independently make sense of scientific language. These differences suggest that while the problem of limited vocabulary is universal, its depth and impact vary depending on learners' exposure, support systems, and instructional context. This finding is supported by Shanahan (2021) who emphasizes that disciplinary literacy in Science demands more than basic reading skills, as learners must understand both content-specific language and conceptual meanings. The triangulation of perspectives across different school environments demonstrates a strong convergence in identifying vocabulary as a critical barrier, while also revealing contextual differences in its manifestation, reinforcing that addressing vocabulary and comprehension gaps is essential in improving learners' understanding of Science concepts.

- *Diverse Reading Levels and Low Engagement*

The findings of the study reveal that diverse reading levels and low learner engagement pose significant challenges for teachers in enhancing learners' reading comprehension of Science concepts across different school environments. Across all school contexts, teachers consistently experience difficulty in balancing instruction to accommodate varying reading abilities while simultaneously sustaining learner engagement throughout the learning process. This challenge underscores the complexity of addressing the diverse literacy needs of learners within a single classroom setting. Despite this shared concern, variations and subtle contradictions emerge in how teachers

perceive and respond to learner diversity and engagement. While some teachers view differentiated instruction as an effective means of addressing varying reading levels, others emphasize the limitations imposed by time constraints, curricular demands, and learners' differing levels of motivation. These differences suggest that although diverse reading levels are universally acknowledged as a major challenge, the extent of their impact and the instructional responses employed vary according to contextual factors and classroom realities. This finding is supported by Larkin et al. (2023), who emphasize that diverse learner abilities require differentiated instruction, yet time constraints often limit teachers' capacity to effectively address all learners' needs. Similarly, Moje (2020) highlights that rigid curriculum demands can reduce opportunities for meaningful engagement and interaction with texts, particularly among struggling readers. The triangulation of perspectives across different school environments demonstrates strong convergence in recognizing learner diversity as a significant challenge while also revealing contextual differences in its impact, reinforcing that addressing varied reading levels and sustaining learner engagement are critical concerns in improving learners' comprehension of Science concepts.

- *Lack of Resources, Time, and Support*

The findings of the study reveal that the lack of resources, time, and support significantly constrains teachers' ability to effectively enhance learners' reading comprehension of Science concepts across different school environments. Across all school contexts, teachers identify these limitations as major barriers to implementing instructional strategies that foster meaningful engagement with scientific texts and concepts. Despite these shared constraints, variations emerge in how these challenges are experienced and managed. Teachers in large schools primarily struggle with time limitations brought about by extensive curriculum demands and the need to address diverse learner needs within limited instructional periods. In medium-sized schools, teachers face a dual challenge of inadequate instructional materials and insufficient parental support, both of which hinder efforts to reinforce reading comprehension skills. In contrast, teachers in small school settings highlight deeper socio-cultural concerns, particularly the lack of literacy support at home, which further contributes to learners' difficulties in understanding scientific texts. These differences suggest that while the lack of resources, time, and support is a widespread concern, its nature and impact are shaped by contextual realities such as school environment, learner characteristics, and community conditions. This finding is supported by Larkin et al. (2023), who emphasize that curriculum demands and time limitations often restrict teachers' ability to implement effective literacy strategies in content-area instruction. Similarly, Goldman and Snow (2022) highlight that limited instructional resources, coupled with inadequate professional and home support, hinder the effective integration of reading comprehension strategies in Science education. The triangulation of perspectives across different school environments demonstrates strong convergence in recognizing these systemic constraints while also revealing contextual differences in their manifestation and impact, reinforcing the

importance of institutional, familial, and community support in addressing challenges related to learners' reading comprehension of Science concepts.

Meanwhile, the second research question focuses on the coping mechanisms of teachers on the challenges in enhancing learners' reading comprehension in Science. It highlights how teachers actively cope by adjusting their instructional practices, simplifying complex scientific texts, and providing targeted support to meet diverse learner needs. These coping strategies demonstrate teachers' continuous efforts to manage difficulties related to vocabulary limitations, low engagement, and varying reading abilities among learners. The themes of coping mechanisms of teachers are found below.

- *Instructional Scaffolding and Differentiated Literacy Practices*

The theme underscores how teachers intentionally adjust their instruction to support learners with varying reading abilities in Science. It reflects teachers' efforts to break down complex scientific concepts through simplified texts, guided reading, and targeted vocabulary support to make learning more accessible and meaningful for all learners. In addition, the theme highlights the importance of differentiated instruction, where teachers modify strategies, learning tasks, and support systems to ensure that learners at different levels can meaningfully engage with scientific texts. These instructional adjustments demonstrate teachers' responsiveness to learners' diverse needs and their commitment to bridging comprehension gaps in Science learning. Overall, the findings illustrate how teachers provide structured and adaptive support that helps learners gradually build confidence, improve comprehension, and develop stronger understanding of Science concepts.

- *Simplification and Vocabulary Support*

The findings of the study reveal that simplification and vocabulary support are central coping mechanisms employed by teachers across different school environments to enhance learners' reading comprehension of Science concepts. In small schools, teachers emphasize simplifying complex texts and translating difficult scientific terms to make content more accessible to learners. In medium schools, teachers likewise simplify instruction but often integrate this with concrete supports such as visuals, examples, and guided explanations to strengthen understanding. Meanwhile, in large schools, teachers implement more systematic vocabulary scaffolding strategies, including pre-teaching key terms and modifying instructional materials to reduce linguistic difficulty. Across all contexts, teachers consistently prioritize breaking down language barriers to ensure that learners can meaningfully engage with scientific texts. Despite these similarities, variations emerge in the depth and manner of implementation. Teachers in large schools tend to apply more structured and formalized vocabulary instruction, reflecting more organized instructional systems, while medium school teachers rely on simplified explanations and guided questioning due to contextual constraints. In contrast, small school teachers place greater emphasis on translation and contextual simplification, reflecting the linguistic diversity

and resource limitations of their learning environments. These findings align with Snow (2021), who asserts that explicit vocabulary instruction significantly enhances comprehension by enabling learners to access disciplinary language, and Pearson (2020), who emphasizes that simplifying complex texts and providing scaffolded support are essential for helping learners construct meaning from academic content. The triangulation of perspectives across small, medium, and large school environments demonstrates a shared recognition that vocabulary and language complexity are major barriers to comprehension, although the strategies used to address these challenges vary depending on contextual factors such as resources, learner needs, and instructional conditions.

- *Differentiated Instruction and Peer Support*

The study shows that differentiated instruction and peer support are key coping mechanisms used by teachers to address learners' diverse reading abilities in Science across different school environments. In small schools, teachers demonstrate strong adaptability by continuously adjusting their instructional strategies to match learners' varying levels of understanding, reflecting a highly responsive and individualized approach. In medium schools, peer support emerges as a practical and effective strategy for differentiation, where teachers modify instructional approaches by incorporating peer tutoring and differentiated activities that respond to learners' varying capacities. In large schools, teachers adopt a more structured approach to differentiation by extending instruction beyond standard practices and implementing broader instructional modifications to accommodate class-wide diversity. While all participants recognize the importance of differentiation, differences are evident in how peer support and instructional adjustments are applied in practice. Teachers in large schools tend to focus on systematic and whole-class adaptations to manage diverse learners, whereas medium school teachers rely more on peer tutoring and collaborative activities as immediate and practical solutions. In contrast, small school teachers emphasize continuous and flexible adjustment of teaching strategies, reflecting a more personalized approach to instruction. These findings are supported by Tomlinson (2019), who emphasizes that differentiated instruction is essential in addressing learners' readiness, interests, and learning profiles to ensure equitable learning opportunities. Similarly, Hattie (2020) highlights that peer learning and collaborative support significantly enhance student achievement by allowing learners to construct understanding through interaction. The triangulation of perspectives across school environments indicates a shared commitment among teachers to inclusive learning, although the specific strategies employed vary depending on contextual realities such as class size, available resources, and learner diversity.

- *Guided Reading and Questioning Strategies*

The findings of the study indicate that guided reading and questioning strategies are essential coping mechanisms that teachers employ to monitor and enhance learners' comprehension of Science texts across different school environments. In small schools, teachers emphasize active learner engagement through questioning and immediate

feedback during reading activities, allowing for more interactive and responsive classroom exchanges. In medium schools, guided reading is implemented through more structured procedures, including explicit directions, step-by-step guidance, and regular comprehension checks to ensure understanding. In large schools, teachers apply systematic questioning strategies that are integrated into their instructional routines to support sustained comprehension development. Despite these shared practices, variations are evident in the level of structure and manner of implementation. Teachers in large schools tend to use more consistent and pre-planned questioning techniques as part of formal instructional strategies, while medium school teachers incorporate questioning primarily to clarify instructions and confirm task understanding. In contrast, small school teachers rely more on spontaneous and learner-initiated questioning, reflecting a more flexible and interactive classroom environment. These findings align with recent research emphasizing the importance of guided reading and questioning in strengthening comprehension. Fisher and Frey (2021) assert that guided reading provides structured opportunities for teachers to scaffold learners' understanding through purposeful questioning, prompting, and feedback. Similarly, Taboada Barber et al. (2021) highlight that questioning strategies foster deeper comprehension by encouraging learners to actively process, monitor, and evaluate information during reading. The triangulation of perspectives across small, medium, and large school environments demonstrates that although the structure and delivery of guided reading differ, questioning remains a universal and effective strategy for enhancing learners' comprehension of Science concepts.

- *Collaborative, Experiential, and Context-Based Meaning Construction*

This second main theme highlights how teachers cope with challenges by creating learning environments where learners actively engage with Science concepts through interaction, experience, and real-life connections. It reflects the use of group work, peer collaboration, and shared discussions as key strategies that allow learners to co-construct meaning and support one another's understanding of scientific content. The findings suggest that learning becomes more effective when students are actively involved in the learning process and when instruction is meaningfully connected to their everyday experiences and contexts. Through collaborative learning, learners are provided with opportunities to exchange ideas, clarify misconceptions, and construct knowledge collectively, which ultimately strengthens both comprehension and engagement in Science. Overall, this theme underscores the importance of interactive and experiential learning environments in supporting learners' understanding of complex scientific concepts.

- *Peer Collaboration and Group Learning*

This sub-theme reveals that peer collaboration and group learning serve as effective coping mechanisms that teachers employ to enhance learners' reading comprehension of Science concepts across different school environments. In small schools, collaboration is used to actively engage learners and encourage participation, particularly among

those who struggle with comprehension, through open discussions and flexible group interactions. In medium schools, peer tutoring emerges as a dominant strategy to address differences in learners' abilities, allowing more capable learners to assist their peers in understanding scientific texts and concepts. In large schools, collaboration is also emphasized but is implemented through more structured group activities that are formally integrated into lesson tasks and classroom assessments. Across all school contexts, teachers consistently use peer interaction as a means of supporting understanding, improving engagement, and facilitating meaning-making in Science learning. Despite these similarities, variations are evident in how collaboration is organized and applied. Teachers in large schools tend to implement group work in a more structured and systematic manner, while medium school teachers rely heavily on peer tutoring as an immediate intervention for struggling learners. In contrast, small school teachers favor more open-ended discussions and informal idea-sharing, reflecting a more flexible and learner-responsive classroom environment. These findings are supported by Gillies (2020), who emphasizes that cooperative learning enhances academic achievement by promoting interaction, shared responsibility, and deeper processing of information. Similarly, Hattie (2020) highlights that peer learning has a significant positive effect on student achievement, as learners benefit from explaining concepts and receiving feedback from their peers. The triangulation of perspectives across small, medium, and large school environments demonstrates that while the structure of collaboration varies, all teachers recognize peer interaction as a powerful strategy for improving learners' comprehension of Science concepts.

- *Hands-on and Experiential Learning*

This sub-theme shows that hands-on and experiential learning serve as coping mechanisms that teachers employ to enhance learners' reading comprehension of Science concepts by linking text-based knowledge with actual experiences. In small schools, teachers strongly emphasize experiential learning to make abstract scientific ideas more concrete, meaningful, and accessible to learners. In medium schools, hands-on learning is also evident through classroom experiments and practical activities that allow learners to directly engage with scientific concepts. In large schools, experiential learning is often integrated with structured group activities to ensure both engagement and guided understanding. Across all school contexts, teachers consistently use hands-on approaches to bridge the gap between reading and conceptual understanding in Science. Despite these similarities, differences are observed in how experiential learning is implemented. Teachers in large schools tend to embed hands-on activities within structured lessons and group tasks, while medium school teachers rely on practical experiments as direct instructional tools to support comprehension. In contrast, small school teachers emphasize experiential learning as a primary instructional strategy, often maximizing real-life and interactive experiences to compensate for limited resources. These findings are supported by Kolb (2021), who emphasizes that experiential learning enhances understanding by allowing learners to actively engage, reflect, and apply knowledge in

meaningful contexts. Similarly, Darling-Hammond et al. (2020) highlight that hands-on and inquiry-based learning approaches improve students' conceptual understanding and engagement, particularly in Science education. The triangulation of perspectives across small, medium, and large school environments demonstrates that while the level of structure and resources may vary, experiential learning remains a shared and effective strategy for enhancing learners' comprehension of Science concepts.

- *Multimedia and Real-Life Integration*

The findings indicate that multimedia and real-life integration are important coping mechanisms that teachers use to enhance learners' reading comprehension of Science concepts by making learning more engaging, concrete, and relatable. In small schools, teachers maximize available resources by connecting lessons to learners' everyday experiences and using simple multimedia tools to support understanding of scientific ideas. In medium schools, teachers rely on visual and contextual materials such as pictures, charts, and video presentations to aid comprehension and make abstract concepts more accessible. In large schools, multimedia and real-life integration are often embedded within structured lessons, where teachers systematically combine reading tasks with visual aids and contextual examples to reinforce conceptual understanding. Across all school contexts, teachers consistently use multimedia and real-life connections to bridge the gap between abstract scientific content and learners' lived experiences, thereby enhancing comprehension and engagement. Despite these shared practices, differences emerge in the availability, accessibility, and systematic use of multimedia resources. Teachers in large schools tend to integrate multimedia more systematically as part of their instructional design, while medium school teachers utilize available technological tools such as pictures and television to support comprehension. In contrast, small school teachers emphasize real-life connections and adapt to limited technological resources by creatively situating learning within learners' immediate environments. These findings are supported by Schindler et al. (2020), who highlight that the integration of digital tools and real-world contexts increases student engagement and promotes deeper learning by making content more relevant and interactive. The triangulation of perspectives across small, medium, and large school environments demonstrates that while access to multimedia resources may vary, all teachers recognize the importance of integrating real-life contexts and visual supports as effective strategies for enhancing learners' reading comprehension of Science concepts.

- *Reflective Practice and Instructional Refinement*

This theme underscores how teachers continuously evaluate and adjust their teaching strategies to effectively address learners' difficulties in reading comprehension within Science. Teachers engage in reflective processes by analyzing learners' performance, participation, and responses, allowing them to identify gaps in understanding and areas that require instructional improvement. This adaptive practice demonstrates that effective teaching is not static but is instead dynamic, evolving through ongoing

reflection, assessment, and responsiveness to classroom realities. Through this process, teachers are able to refine their instructional decisions, modify lesson delivery, and implement more appropriate strategies that better support learners' comprehension of scientific texts. Overall, the theme highlights reflection as a critical driver of instructional improvement and learner-centered teaching in Science education.

- *Assessment-Based Instructional Decisions*

The findings of the study reveal that assessment-based instructional decisions are central to teachers' reflective practice in enhancing learners' reading comprehension in Science, as teachers consistently rely on learners' performance data to guide instructional refinement. In small schools, teachers emphasize continuous classroom observation, learner outputs, and participation as primary sources of evidence for determining instructional needs and adjusting lessons. In medium schools, assessment is used to modify instruction in ways that ensure comprehension before proceeding to new content, often through clarification of instructions and simplification of tasks. In large schools, teachers also rely on structured questioning and systematic monitoring of learners' understanding to guide instructional decisions and ensure content mastery. Across all school contexts, teachers consistently use assessment as a foundation for identifying learning gaps and making instructional adjustments that support learners' comprehension of scientific texts. Despite these similarities, triangulation of perspectives reveals differences in how assessment data are utilized depending on school context. Teachers in large schools tend to apply more structured questioning and organized monitoring systems to guide instruction, while those in medium schools integrate assessment through procedural adjustments that focus on clarifying and refining learning tasks. In contrast, small school teachers rely more heavily on direct observation and learner participation due to limited formal assessment tools, yet still make meaningful instructional decisions based on available evidence of learner performance. This finding aligns with Black and Wiliam (2020), who emphasize that formative assessment is most effective when teachers actively use evidence of student learning to adapt instruction in real time.

- *Instructional Adjustment and Lesson Modification*

The findings of the study reveal that instructional adjustment and lesson modification are essential coping mechanisms teachers employ to respond to learners' varying comprehension levels in Science reading. In small schools, teachers emphasize flexibility and immediate adaptation of instruction based on learners' needs, allowing lessons to be adjusted in real time to support understanding. In medium schools, teachers modify lessons by restructuring content and breaking down topics into manageable parts to accommodate limited time and learners' varying capacities. In large schools, instructional adjustment is reflected in pacing and scaffolding strategies, as teachers slow down instruction, provide more detailed explanations, and deliver lessons in a step-by-step manner to ensure comprehension. Across all school contexts, teachers consistently modify instruction to ensure that learners can meaningfully engage with scientific

texts and concepts. However, triangulation of perspectives shows variations in how instructional adjustments are implemented depending on school context and available resources. Teachers in large schools tend to adjust through structured scaffolding and pacing modifications, while those in medium schools focus on content reduction and lesson unpacking due to time constraints. In contrast, small school teachers emphasize adaptive, learner-centered adjustments that prioritize relevance, accessibility, and responsiveness to immediate learner needs. This finding aligns with Tomlinson (2021), who emphasizes that differentiated instruction requires continuous modification of content, process, and pacing based on learner readiness and context. Similarly, Graham et al. (2022) highlight that effective instructional adaptation improves student engagement and comprehension by aligning teaching strategies with learners' cognitive and contextual needs. Overall, the findings demonstrate that despite contextual differences, teachers across all school environments consistently engage in instructional adjustment as a reflective response to learners' challenges in reading comprehension within Science.

- *Reflection and Professional Collaboration*

This theme shows that reflection and professional collaboration are important coping mechanisms that enable teachers to continuously improve their instructional practices in enhancing learners' reading comprehension in Science. In small schools, teachers highlight reflection through classroom observation and peer interaction, using day-to-day teaching experiences as a basis for instructional improvement. In medium schools, collaboration is evident in the sharing of strategies and collective adjustment of instruction, while reflection is grounded in monitoring learners' engagement and performance to guide teaching decisions. In large schools, teachers also demonstrate reflective practice through continuous evaluation of learners' understanding, supported by peer collaboration such as group work and shared instructional planning. Across all school environments, teachers consistently engage in reflection and collaboration as integral processes in refining their instructional approaches to improve Science reading comprehension. Despite these similarities, triangulation reveals differences in how reflection and collaboration are practiced across school contexts. Teachers in large schools tend to engage in more structured reflection supported by assessment results and formal collaborative instructional planning, while medium school teachers rely more on informal peer exchanges and classroom-based reflection to adjust instruction. In contrast, small school teachers emphasize experiential reflection and learning from colleagues in a more flexible and context-driven manner due to limited formal professional development structures. This finding is supported by Avalos (2020), who emphasizes that teacher professional development is most effective when grounded in collaborative reflection and shared practice among educators. Similarly, Vangrieken et al. (2021) highlight that professional collaboration enhances teacher learning by fostering reflective dialogue, collective problem-solving, and instructional improvement. Overall, the triangulation of perspectives shows that while the forms of reflection and collaboration vary across school environments,

all teachers recognize them as essential mechanisms for refining instruction and improving learners' comprehension in Science.

Finally, the third research question focuses on generating meaningful and actionable insights derived from teachers' lived experiences in integrating reading comprehension within Science instruction. It seeks to provide guidance for educators in refining their instructional practices, particularly in addressing learners' difficulties in understanding scientific texts and concepts. These insights aim to contribute evidence-based recommendations that can help strengthen teachers' instructional strategies and enhance learners' comprehension, engagement, and overall academic performance in Science. The following are the actionable insights of this study: (1) Strengthening Structured Literacy Integration and Professional Capacity Building in Science Instruction; and (2) Enhancing Formative Assessment Practices and Reflective Teaching for Instructional Refinement and Differentiation. These insights emphasize the importance of continuous professional support and evidence-based instructional practices in improving learners' reading comprehension of Science concepts, highlighting the need for sustained teacher development and data-informed pedagogy.

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