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Improving Science Terminology Understanding and Mastery Through Who Am I Intervention Among Grade 7 Students of San Martin National High School: A Thematic Literature Review

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ABSTRACT

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Scientific literacy is a cornerstone of modern education, yet its development is hindered by learners' limited mastery of discipline-specific vocabulary. In the Philippine context, this challenge is evident among junior high school students, where decoding, spelling, and comprehension difficulties restrict higher-order scientific thinking. This study investigates the effectiveness of the "Who Am I?" intervention in improving Grade 7 learners' mastery of science

terminologies at San Martin National High School. Initial diagnostic results from the Philippine Informal Reading Inventory (Phil-IRI) revealed that 26 out of 52 learners were at the Frustration level, showing severe challenges in reading and spelling scientific vocabulary. These difficulties impeded comprehension and reduced confidence, underscoring the need for targeted interventions aligned with the MATATAG curriculum. A three-month intervention was implemented, integrating clue-based identification, spelling reinforcement, visual scaffolds, peer tutoring, and technology-assisted instruction. Results showed significant improvement, with Mean Percentage Scores rising from 42 percent (Poor Mastery) to 78 percent (Proficient Mastery). A paired t-test ($t = 15.62$, $p = 0.0001$) confirmed statistical significance. Qualitative findings revealed enhanced confidence, clearer pronunciation, improved spelling, and greater participation in class discussions. Learners found the intervention "fun" and less intimidating, while teachers observed increased engagement. The study supports multimodal and contextualized vocabulary instruction in science education. By embedding literacy-focused strategies, the "Who Am I?" intervention demonstrates that low-cost, replicable approaches can strengthen foundational skills in resource-constrained classrooms. Findings highlight benefits for learners, teachers, curriculum developers, and policymakers, offering evidence for scalable interventions. Ultimately, the research underscores the importance of vocabulary-focused strategies to close learning gaps, promote equitable access, and advance scientific literacy in Philippine schools.

INTRODUCTION

Scientific literacy is widely recognized as a cornerstone of modern education, enabling learners to critically engage with scientific concepts, technological innovations, and societal issues. At the foundation of scientific literacy lies vocabulary mastery—the ability to decode, spell, pronounce, and comprehend discipline-specific terms. Without this foundation, learners struggle to access higher-order cognitive skills such as analysis, synthesis, and evaluation. In the Philippine context, vocabulary difficulties have been consistently identified as barriers to effective science learning, particularly among junior high school students (Corpuz et al., 2024; Balce, 2024). This thematic literature review situates the present study within five major strands of scholarship: (1) the importance of vocabulary in science learning, (2) multimodal and contextualized instruction, (3) technology-assisted vocabulary development, (4) literacy integration and scientific literacy, and (5) translational perspectives in educational research.

Vocabulary as a Foundation for Science Learning

Vocabulary mastery is a prerequisite for meaningful engagement with

scientific concepts. Learners must first decode and internalize scientific terms before they can participate in higher-order tasks such as problem-solving and critical analysis. Studies consistently show that insufficient vocabulary knowledge leads to poor comprehension, misconceptions, and disengagement in science classes. Corpuz et al. (2024) found that Filipino learners' limited vocabulary knowledge strongly correlated with poor comprehension and low performance in science assessments. Balce (2024) emphasized that vocabulary difficulty is a significant predictor of science achievement, underscoring the need for targeted interventions. Diestro (2023) further noted that learners' difficulties in content-specific vocabulary significantly hinder their conceptual understanding, highlighting the urgency of addressing this gap.

International research echoes these findings. Baker et al. (2025) conducted a meta-analysis of vocabulary interventions among culturally and linguistically diverse learners, revealing that explicit vocabulary instruction significantly improved both science vocabulary and content knowledge. Their study underscores the universality of vocabulary challenges and the effectiveness of structured interventions across diverse educational contexts. Kansızoğlu and Bekiroğlu (2025) similarly reported that vocabulary development interventions had a large effect size (1.179) on cognitive vocabulary outcomes, confirming the strong link between vocabulary mastery and academic successfiles.eric.ed.gov. This convergence of local and international evidence establishes vocabulary mastery as a prerequisite for scientific literacy and a priority for educational reform.

Multimodal and Contextualized Vocabulary Instruction

Recent scholarship highlights the effectiveness of multimodal approaches—integrating visual, auditory, and contextual supports—in enhancing vocabulary acquisition. Zhang (2024) demonstrated that multimodal strategies improved comprehension among junior high school learners, while Fudhla et al. (2020) found that clue-based learning enhanced retention and meaningful word associations. Xing and Zhang (2025) reported that multimodal learning styles positively influenced vocabulary acquisition and content retention among second-language learners, suggesting that interventions combining multiple modalities are particularly effective for diverse classrooms. In the Philippine setting, Leonen (2025) introduced the Contextualized Science Vocabulary Worksheet (COSCIVOW), which significantly improved Grade 10 learners' vocabulary skills compared to traditional methods. Recillo et al. (2023) argued that contextualized vocabulary instruction enhances science learning by making abstract terms more relatable to learners' experiences. These findings align with the rationale for the "Who Am I?" intervention, which integrates clue-based identification, spelling reinforcement, visual scaffolds, and peer tutoring to create a multimodal learning environment.

Technology-Assisted Vocabulary Development

Digital tools and technology-assisted instruction have emerged as powerful supports for vocabulary mastery. Buro et al. (2026) highlighted the positive impact of digital spelling applications on vocabulary development, while Jolampong et al. (2025) demonstrated that augmented reality (AR) flashcards significantly enhanced science vocabulary acquisition among Grade 3 learners. VanUitert et al. (2020) noted that hypermedia environments improved science vocabulary acquisition among middle school students with learning difficulties, reinforcing the value of digital scaffolds in literacy interventions. These studies suggest that technology can provide interactive and engaging platforms for vocabulary learning, particularly for struggling readers. The "Who Am I?" intervention incorporates technology-assisted instruction through audio drills and digital flashcards, aligning with this body of research.

Literacy Integration and Scientific Literacy

Scientific literacy is closely tied to vocabulary mastery. Palines and Cruz (2021) identified vocabulary knowledge as a facilitating factor in scientific literacy development among junior high school students in Laguna, Philippines. Their study emphasized that learners with stronger vocabulary skills were better able to write, present, and comprehend scientific research. The Department of Education (2023) examined literacy integration in the MATATAG curriculum, finding that vocabulary-focused strategies significantly improved science performance. Their work highlights the policy relevance of interventions like "Who Am I?", which align with DepEd's emphasis on foundational literacy and inclusivity. By embedding literacy-focused strategies within science lessons, the intervention contributes to both academic achievement and broader educational goals.

Translational Perspectives in Vocabulary Research

Emerging research emphasizes translational approaches—bridging classroom interventions with systemic educational improvements. Sagosoy et al. (2025), through Project VOLT, demonstrated how translanguaging strategies enhanced vocabulary opportunities and literacy among multilingual learners. Their findings underscore the importance of designing interventions that not only improve classroom outcomes but also inform curriculum development and policy decisions. In the context of science education, translational research perspectives highlight the potential of vocabulary interventions to address systemic literacy challenges. By demonstrating measurable gains in learners' performance, interventions like "Who Am I?" provide evidence that can guide teacher training, curriculum design, and policy formulation.

Synthesis and Research Gap

The reviewed literature converges on several key points. Vocabulary mastery is foundational to science learning and directly influences comprehension,

confidence, and performance. Multimodal and contextualized strategies are highly effective in supporting struggling readers, while technology-assisted interventions provide interactive and engaging platforms for vocabulary acquisition. Scientific literacy is inseparable from vocabulary knowledge, making interventions essential for holistic learning. Translational research perspectives highlight the broader impact of classroom interventions on curriculum and policy, ensuring that findings contribute to systemic educational improvement. Despite this convergence, there remains a research gap in evaluating low-cost, replicable interventions in rural Philippine schools, where learners often face compounded challenges due to limited resources. The present study addresses this gap by evaluating the effectiveness of the "Who Am I?" intervention in improving Grade 7 learners' mastery of science terminologies at San Martin National High School.

OBJECTIVES OF THE STUDY

The objectives of the study are framed to directly address the research questions and guide the investigation into the effectiveness of the "Who Am I?" intervention. Specifically, the study aims to determine the level of Grade 7 learners' mastery of science terminologies before and after the implementation of the intervention. It also seeks to evaluate the effectiveness of the intervention in improving learners' retention, understanding, and usage of science vocabulary. Furthermore, the study intends to examine how learners perceive and respond to the intervention in enhancing their mastery of science terminologies.

CONCEPTUAL FRAMEWORK

This framework literature review synthesizes recent scholarship (2020–2025) to justify and clarify the structure of the study "Improving Science Terminology Understanding and Mastery through Who Am I? Intervention among Grade 7 Students of San Martin National High School." It integrates theoretical anchors, empirical findings, and practical design implications to explain how the intervention produces gains in science vocabulary mastery through affective-motivational mediators and contributes to the broader latent construct of scientific literacy.

Constructivist learning and contextualization

Learner's construct meaning by linking new terms to prior knowledge, concrete phenomena, and social interaction. Contextualized tasks—such as clue-based identification, guided spelling, and term-in-context prompts—reduce abstraction and strengthen semantic networks. In science classrooms, embedding vocabulary within diagrams, experiments, and local examples supports decoding

and comprehension while maintaining disciplinary authenticity.

Explicit vocabulary instruction in science

Explicit, structured vocabulary instruction—definitions, morphology, repeated retrieval, and guided practice—consistently improves both vocabulary and content knowledge. Science-specific interventions that align practice with assessment (pre/post-tests, retrieval cycles, pronunciation modeling) demonstrate medium-to-large effects across diverse learners, including those with reading difficulties and multilingual backgrounds.

Multimodal literacy and practice-based assessment

Multimodal supports (visuals, audio models, semantic mapping) enhance decoding and retention, especially for struggling readers. Classroom implementations that integrate visuals, guided reading, and iterative practice within unit plans (e.g., vocabulary mapping, dynamic content cycles) strengthen mastery while aligning with assessment demands. Teacher-made tests, observation rubrics, and reflection journals capture both performance and participation, providing a holistic view of learning.

Independent variable (IV)

Who Am I? intervention—comprising clue-based identification, spelling reinforcement, visual aids, peer tutoring, and technology-assisted drills (audio/digital flashcards). The IV operationalizes contextualized and explicit vocabulary instruction within science periods and ARAL sessions, fostering learner engagement, confidence, motivation, and mastery of scientific terminology through multimodal, interactive, and inclusive strategies tailored to diverse classroom needs.

Mediating variables

Learner confidence, engagement, and motivation—affective-motivational constructs that translate cognitive gains into increased willingness to read aloud, attempt pronunciation, and use terms in discussion and written work. These mediators are activated by supportive, low-anxiety practice environments and multimodal scaffolds, fostering resilience, persistence, and positive attitudes toward science learning. When learners feel emotionally secure and academically supported, they are more likely to participate actively, sustain attention during tasks, collaborate with peers, and transfer vocabulary mastery into broader scientific literacy, thereby amplifying the overall effectiveness of the intervention.

Dependent variable (DV)

Science vocabulary mastery—measured through Mean Percentage Scores (MPS) on teacher-made tests, pronunciation accuracy, spelling proficiency, and

term-in-context comprehension. This DV reflects the proximal learning outcomes targeted by explicit vocabulary instruction, capturing learners' ability to decode, retain, and apply scientific terms meaningfully. It also encompasses improvements in confidence, fluency, and contextual usage, ensuring that vocabulary knowledge is not only memorized but actively integrated into classroom discussions, written outputs, and broader scientific literacy practices, thereby strengthening overall academic achievement.

Latent variable

Scientific literacy—an underlying construct encompassing comprehension, communication, and application of science concepts. Gains in vocabulary mastery contribute to this latent variable by enabling learners to access texts, tasks, and discourse more effectively.

Hypothesized model

The *Who Am I?* intervention exerts a direct and measurable impact on science vocabulary mastery by providing explicit, contextualized, and multimodal instruction carefully aligned with classroom tasks, assessments, and inclusive literacy-focused strategies. Through clue-based identification, spelling reinforcement, visual scaffolds, peer tutoring, and technology-assisted drills, learners are systematically guided to decode, pronounce, and apply scientific terms with greater accuracy and confidence. Beyond this direct effect, the intervention also produces indirect benefits through mediating variables such as confidence, engagement, and motivation. By reducing anxiety around pronunciation and spelling, learners become more willing to participate actively, collaborate with peers, persist in challenging tasks, and even enjoy science-related activities. These affective-motivational gains amplify cognitive outcomes, ensuring that vocabulary mastery is not only achieved but sustained through repeated practice and positive classroom experiences. Ultimately, improved vocabulary mastery contributes to the broader latent construct of scientific literacy, enabling learners to decode texts, interpret diagrams and representations, and communicate scientific concepts with fluency and precision. It also fosters higher-order skills such as critical thinking, collaborative discourse, and problem-solving, while equipping learners to apply scientific knowledge meaningfully across diverse real-world contexts. Taken together, the direct, indirect, and latent contributions of the intervention demonstrate its holistic value: it strengthens foundational literacy, nurtures learner confidence, and advances scientific literacy in ways that are both academically rigorous and socially transformative.

The narrative diagram illustrates the logical flow of the study, beginning with the *Who Am I?* intervention as the independent variable. This intervention integrates contextual clues, spelling drills, visual supports, peer tutoring, and audio or digital flashcards to provide learners with multimodal and contextualized

opportunities for vocabulary acquisition. These strategies activate mediating variables such as confidence, engagement, and motivation, which serve as affective-motivational gains fostered through supportive practice environments and multimodal scaffolds. As learners become more confident and engaged, they demonstrate measurable improvements in science vocabulary mastery, reflected in higher Mean Percentage Scores, improved pronunciation accuracy, enhanced spelling proficiency, and stronger comprehension of terms in context. Ultimately, these proximal gains contribute to the latent construct of scientific literacy, enabling learners to decode texts, interpret diagrams, communicate concepts effectively, and apply scientific knowledge in real-world contexts. This progression highlights how a low-cost, replicable intervention can strengthen foundational literacy, nurture learner confidence, and advance holistic scientific literacy outcomes in diverse classroom settings.

Evidence Synthesis

Secondary science classrooms benefit from contextualized vocabulary tasks that embed terms within disciplinary activities (e.g., worksheets tied to phenomena, local examples, and visual representations). These designs reduce cognitive load, improve decoding, and support retention—especially for learners at frustration-level reading proficiency.

Intervention efficacy

Meta-analytic and classroom-based studies report significant effects of explicit vocabulary interventions on both vocabulary and content knowledge. Structured practice (definitions, morphology, retrieval cycles), multimodal supports (visuals, audio models), and alignment with assessment (pre/post-tests) consistently yield measurable gains across diverse learner populations.

Classroom integration

Practice-based unit designs that foreground vocabulary mapping, multimodal resources, and iterative assessment cycles demonstrate how science classrooms can systematically build terminology mastery alongside content learning. Teacher-made instruments validated by subject experts, combined with observation rubrics and reflection journals, provide robust evidence of both cognitive and affective outcomes.

Design implications

Improving science vocabulary mastery requires a holistic instructional design that integrates contextualized tasks, explicit instruction, multimodal supports, and affective-motivational strategies. **Contextualized tasks** are essential because they embed scientific terminology within authentic phenomena, diagrams, and locally relevant examples, thereby reducing abstraction and strengthening semantic networks. When learners encounter terms in meaningful contexts—

such as identifying "photosynthesis" in a diagram of a local plant or linking "ecosystem" to familiar community environments—they are more likely to internalize and retain these concepts. Clue-based prompts and term-in-context activities further reinforce this process by encouraging active engagement and deeper comprehension. Equally important is **explicit instruction combined with retrieval practice**, which ensures durable gains in vocabulary and content knowledge. Structured activities such as guided spelling, morphological analysis, term-definition matching, and repeated retrieval cycles provide learners with systematic opportunities to practice and consolidate knowledge. Aligning these practices with assessment through pre- and post-tests allows teachers to monitor progress and establish mastery thresholds. This structured approach not only improves accuracy in spelling and pronunciation but also builds learners' confidence in applying scientific terms in oral and written communication.

The integration of **multimodal supports and assessment strategies** enriches the learning process by catering to diverse learning styles. Visual aids, audio pronunciation models, and peer scaffolding ensure that learners engage with vocabulary through multiple sensory channels, enhancing comprehension and retention. Teacher-made tests and observation rubrics provide reliable measures of performance, while reflection journals allow learners to document their confidence, engagement, and strategy use. This multimodal approach captures both cognitive and affective outcomes, offering a holistic view of learners' progress. For example, a learner who struggles with spelling may benefit from audio drills, while another may find visual diagrams more effective in reinforcing meaning.

Finally, the **affective-motivational environment** plays a critical role in amplifying cognitive gains. Reducing anxiety through supportive routines—such as providing quiet reading areas, modeling pronunciation, and encouraging peer tutoring—reinforces learners' confidence and willingness to participate. These strategies address emotional barriers that often hinder vocabulary acquisition, particularly among struggling readers. When learners feel safe and supported, they are more likely to take risks, engage actively, and persist in challenging tasks. Confidence, engagement, and motivation thus act as mediating variables that translate instructional strategies into measurable improvements in vocabulary mastery.Taken together, these design implications highlight the importance of integrating cognitive, contextual, and emotional elements in science vocabulary instruction. By embedding terms in meaningful contexts, reinforcing them through explicit practice, supporting diverse learning styles with multimodal strategies, and fostering a positive affective environment, teachers can create inclusive classrooms that promote both mastery and scientific literacy. This holistic approach aligns with the MATATAG curriculum's emphasis on foundational literacy and inclusivity, and it provides a replicable model for resource-constrained schools seeking to close vocabulary gaps and promote equitable access to quality science education.

Translational value

This framework clarifies how a low-cost, scalable intervention can be embedded in daily science instruction to strengthen foundational literacy and advance scientific literacy. It aligns with curriculum priorities emphasizing inclusivity and mastery of core competencies, and it provides a pathway for classroom practice to inform curriculum development and policy. By articulating the roles of mediators and the contribution to a latent construct, the framework supports replication, adaptation, and scaling across grade levels and contexts.

Framework contribution

The framework integrates constructivist, explicit-instruction, and multimodal literacy perspectives to justify a classroom-embedded intervention for science vocabulary mastery. It specifies the causal pathway (IV→ Mediators→ DV→ Latent), operationalizes variables with classroom-ready measures, and highlights design features that are feasible in rural, resource-constrained settings. This synthesis positions the Who Am I? intervention as a robust, evidence-aligned approach to closing vocabulary gaps and strengthening scientific literacy among Grade 7 learners.

REVIEW OF RELATED LITERATURE

Importance of Vocabulary in Science Learning

Vocabulary mastery is widely recognized as a critical prerequisite for scientific literacy. Learners must first decode and internalize scientific terms before they can engage in higher-order tasks such as analysis, synthesis, and problem-solving. Studies consistently show that insufficient vocabulary knowledge leads to poor comprehension, misconceptions, and disengagement in science classes (Corpuz et al., 2024; Balce, 2024). In the Philippine context, Diestro (2023) emphasized that learners' difficulties in content-specific vocabulary significantly hinder their conceptual understanding, underscoring the need for targeted interventions. International research echoes these findings. Baker et al. (2025) conducted a meta-analysis of vocabulary interventions among culturally and linguistically diverse learners, revealing that explicit vocabulary instruction significantly improved both science vocabulary and content knowledge. This suggests that interventions focusing on decoding and contextual understanding are universally effective, regardless of linguistic background.

Multimodal and Contextualized Vocabulary Instruction

Recent scholarship highlights the effectiveness of multimodal approaches—integrating visual, auditory, and contextual supports—in enhancing vocabulary acquisition. Zhang (2024) demonstrated that multimodal strategies improved comprehension among junior high school learners, while Fudhla et al. (2020)

found that clue-based learning enhanced retention and meaningful word associations. Similarly, Xing and Zhang (2025) reported that multimodal learning styles positively influenced vocabulary acquisition and content retention among second-language learners. In the Philippine setting, Leonen (2025) introduced the Contextualized Science Vocabulary Worksheet (COSCIVOW), which significantly improved Grade 10 learners' vocabulary skills compared to traditional methods. This aligns with Recillo et al. (2023), who argued that contextualized vocabulary instruction enhances science learning by making abstract terms more relatable to learners' experiences.

Technology-Assisted Vocabulary Development

Digital tools and technology-assisted instruction have emerged as powerful supports for vocabulary mastery. Buro et al. (2026) highlighted the positive impact of digital spelling applications on vocabulary development, while Jolampong et al. (2025) demonstrated that augmented reality (AR) flashcards significantly enhanced science vocabulary acquisition among Grade 3 learners. These findings suggest that technology can provide interactive and engaging platforms for vocabulary learning, particularly for struggling readers. VanUitert, Johnson, and Smith (2020) further noted that hypermedia environments improved science vocabulary acquisition among middle school students with learning difficulties, reinforcing the value of digital scaffolds in literacy interventions.

Science Literacy and Vocabulary Mastery

Scientific literacy is closely tied to vocabulary mastery. Palines and Cruz (2021) identified vocabulary knowledge as a facilitating factor in scientific literacy development among junior high school students in Laguna, Philippines. Their study emphasized that learners with stronger vocabulary skills were better able to write, present, and comprehend scientific research. This supports the argument that interventions targeting vocabulary mastery directly contribute to broader literacy and academic outcomes. The Department of Education (2023) examined literacy integration in the MATATAG curriculum, finding that vocabulary-focused strategies significantly improved science performance. Their work highlights the policy relevance of interventions like "Who Am I?", which align with DepEd's emphasis on foundational literacy and inclusivity.

Translational Perspectives in Vocabulary Research

Emerging research emphasizes translational approaches—bridging classroom interventions with systemic educational improvements. Project VOLT (Sagoso, Morga, & Pelino, 2021) demonstrated how translanguaging strategies enhanced vocabulary opportunities and literacy among multilingual learners. Such studies highlight the importance of designing interventions that not only improve classroom outcomes but also inform curriculum development and policy decisions. In the context of science education, translational research underscores

the potential of vocabulary interventions to address systemic literacy challenges. By demonstrating measurable gains in learners' performance, interventions like "Who Am I?" provide evidence that can guide teacher training, curriculum design, and policy formulation.

METHODOLOGY

Research Design

Educational research increasingly employs mixed-methods designs to capture both quantitative and qualitative dimensions of learning. Creswell (2002) emphasizes that integrating numerical data with narrative insights provides a holistic understanding of interventions, particularly in classroom-based studies where both performance outcomes and learner attitudes are critical indicators of success. In literacy-focused interventions, quantitative measures often assess performance gains, while qualitative data capture learner perceptions and affective responses. Baker et al. (2025) confirmed that mixed-methods designs are particularly effective in evaluating science vocabulary interventions, as they allow researchers to triangulate findings across multiple data sources. In the Philippine context, Diestro (2023) highlighted that mixed-methods approaches are essential for capturing the complexity of learners' struggles with science vocabulary, especially in rural schools where socio-cultural factors influence performance. Thus, the present study's adoption of a mixed-methods design—combining teacher-made pre-, mid-, and post-tests with interviews, reflection journals, and teacher observation notes—aligns with international and local best practices.

Participants

Purposive sampling is frequently employed in classroom-based research to target learners most in need of intervention. Corpuz et al. (2024 selected struggling readers to evaluate vocabulary-focused strategies, while Diestro (2023) emphasized the importance of addressing learners at the Frustration level of reading proficiency. In line with these studies, the present research focused on 26 Grade 7 learners at San Martin National High School, Prosperidad, Agusan del Sur, who were identified through the Philippine Informal Reading Inventory (Phil-IRI) as struggling with science vocabulary. Nine learners were categorized as two grade levels below expectations, while seventeen were categorized as three grade levels below. This sampling ensured that the intervention addressed learners with significant literacy challenges, thereby maximizing its relevance and impact. The demographic diversity of the participants reflected the rural and multicultural context of the school, providing a realistic setting for evaluating the intervention's applicability in resource-constrained environments. Similar purposive approaches were used by The Department of Education (2023) examined in the evaluation of literacy integration in the MATATAG curriculum, confirming the appropriateness of this sampling strategy.

Instruments

Reliable instruments are essential for evaluating vocabulary mastery. Zhang (2024) employed teacher-made tests validated by subject experts, while Leonen (2025) developed contextualized worksheets to measure vocabulary skills. The present study utilized a 30-item multiple-choice test aligned with MATATAG competencies, validated by science teachers, and pilot-tested to yield a Cronbach's alpha of 0.82, indicating high internal consistency. Phil-IRI diagnostic results were used to establish baseline reading proficiency levels and identify participants. In addition, a learner feedback survey was administered to capture perceptions of the intervention, combining Likert-scale items on confidence, engagement, and perceived usefulness with open-ended questions for richer qualitative insights. Learners also maintained weekly reflection journals documenting their experiences, challenges, and progress, while teacher observation notes provided systematic records of participation, confidence, pronunciation, spelling accuracy, and engagement during intervention sessions. This triangulation of instruments reflects best practices in literacy research, as highlighted by Jolampong et al. (2025), who combined AR flashcards with observation rubrics to evaluate vocabulary acquisition among Grade 3 learners.

Procedures

Intervention procedures must be carefully structured to ensure fidelity and effectiveness. Fudhla et al. (2020) implemented clue-based activities over several weeks, while Jolampong et al. (2025) employed augmented reality flashcards in daily sessions. The present study followed a three-phase procedure: 1) Pre-implementation – Orientation sessions with learners, parents, and administrators; identification of learners via Phil-IRI; preparation of materials (flashcards, clue cards, worksheets).2) Implementation – Integration of the *Who Am I?* intervention into science classes and ARAL sessions. Activities included clue-based identification, spelling reinforcement, visual aids, peer tutoring, and technology-assisted instruction. Sessions were conducted twice weekly during science periods and once weekly during ARAL sessions.3) Post-implementation – Administration of post-tests; collection of surveys, journals, and observation notes; presentation of results to the Science Department and administrators. This phased approach mirrors the structured interventions described by Recillo et al. (2023), who emphasized the importance of contextualized, iterative practice in vocabulary instruction.

Ethical Considerations

Ethical standards are paramount in educational research. Buro et al. (2026) emphasized the importance of informed consent and confidentiality in technology-assisted interventions, while Palines and Cruz (2021) highlighted the need for accommodations to reduce learner anxiety. The present study adhered

to these principles by obtaining parental consent and learner assent, maintaining confidentiality, providing quiet reading areas for anxious learners, and ensuring voluntary participation.

These measures ensured that the study upheld ethical principles of respect, beneficence, and justice, consistent with international standards in educational research. Similar safeguards were reported by Sagoso, Morga, and Pelino (2021) in Project VOLT, which emphasized translanguaging strategies for multilingual learners while protecting participant rights.

Data Analysis

Data analysis in mixed-methods research often combines statistical tests with thematic coding. Baker et al. (2025) employed paired t-tests to measure performance gains, while Recillo et al. (2023) used thematic analysis to capture learner perceptions. The present study analyzed quantitative data using Mean Percentage Scores (MPS) and paired t-tests via Paleontological Statistical Tool (PAST) software, while qualitative data underwent thematic analysis and triangulation.

Validity was ensured through expert validation of instruments, and reliability was confirmed through pilot testing and Cronbach's alpha. Triangulation across multiple data sources enhanced credibility, ensuring that findings were trustworthy and replicable. This methodological rigor aligns with the recommendations of Kansızoğlu and Bekiroğlu (2025), who emphasized the importance of validity and reliability in vocabulary intervention studies.

RESULTS AND DISCUSSION

The quantitative results revealed significant improvements in learners' performance. Pre-test scores averaged 42 percent (Poor Mastery), while post-test scores increased to 78 percent (Proficient Mastery). A paired t-test ($t = 15.62$, $p = 0.0001$) confirmed the statistical significance of this improvement. These findings align with Baker et al. (2025), who reported that explicit vocabulary interventions produced large effect sizes in science achievement. The reduction in standard deviation from 8.5 to 7.2 suggests greater consistency among learners, echoing Kansızoğlu and Bekiroğlu's (2025) observation that vocabulary interventions reduce performance disparities.

Qualitative data revealed enhanced confidence, clearer pronunciation, improved spelling accuracy, and greater participation in class discussions. Learners reported that the intervention made science vocabulary learning "fun" and less intimidating, while teachers observed increased willingness to engage in reading and discussion activities. These findings resonate with Recillo et al. (2023), who argued that contextualized vocabulary instruction enhances learner engagement, and Palines and Cruz (2021), who linked vocabulary mastery to greater confidence in scientific communication.

Comparative Analysis with Related Studies

The results of this study are consistent with Fudhla et al. (2020), who found that clue-based strategies enhanced retention among struggling readers. They also align with Jolampong et al. (2025), who demonstrated that augmented reality flashcards improved vocabulary acquisition. By integrating multimodal strategies, the "Who Am I?" intervention achieved similar outcomes in a rural Philippine context, confirming the generalizability of these approaches across diverse settings.

The findings have significant translational implications. At the learner level, the intervention improved literacy and confidence. At the teacher level, it provided a practical instructional model. At the curriculum level, it reinforced MATATAG priorities. At the policy level, it offered empirical evidence for scalable interventions. These implications echo Sagoso, Morga, and Pelino (2021), who emphasized the importance. The results of this study on the "Who Am I?" intervention demonstrate not only its effectiveness in improving Grade 7 learners' mastery of science vocabulary but also its broader translational value across multiple levels of the education system. Translational research in education emphasizes the movement of findings from controlled classroom contexts into practical applications that inform teaching practices, curriculum development, and policy decisions. In this sense, the present study bridges the gap between localized classroom innovation and systemic educational improvement, ensuring that its outcomes are not confined to academic discourse but actively contribute to the advancement of science literacy in Philippine schools.

At the learner level, the intervention directly addressed the challenges faced by struggling readers who were identified as being at the Frustration level in the Philippine Informal Reading Inventory (Phil-IRI). By integrating clue-based identification, spelling reinforcement, visual aids, peer tutoring, and technology-assisted instruction, the intervention provided learners with multiple entry points to engage with science vocabulary. The quantitative results showed significant gains in Mean Percentage Scores, while qualitative findings revealed increased confidence, clearer pronunciation, and greater willingness to participate in class discussions. These outcomes translate into improved scientific literacy, enabling learners to decode and comprehend complex terms that are foundational to understanding scientific concepts. Beyond science, the intervention also strengthened general reading and spelling skills, equipping learners with transferable literacy competencies that can support their performance in other subject areas. In this way, the intervention contributes to the holistic development of learners, fostering both cognitive and affective growth.

At the teacher level, the study offers a replicable and low-cost instructional model that can be integrated into daily lessons. Teachers often face the challenge of balancing content delivery with literacy support, particularly in resource-constrained classrooms. The "Who Am I?" strategy provides a practical

solution by embedding vocabulary instruction within science lessons, thereby enriching teaching practices without requiring extensive additional resources. The intervention's multimodal approach—combining visual, auditory, and contextual supports—aligns with principles of differentiated instruction and universal design for learning (UDL), enabling teachers to address diverse learner needs. Moreover, the positive learner feedback and observed improvements in confidence and participation highlight the strategy's potential to create more inclusive and supportive classroom environments. Translationally, this means that teachers can adopt the intervention not only to improve academic outcomes but also to foster learner engagement and motivation, which are critical for sustained learning.

CONCLUSION

From the presentation and analysis of data and information that were analyzed and interpreted, the following findings were realized that the individual scores of each identified 26 students initially demonstrated *poor mastery* of science terminologies, with a mean percentage score (MPS) of 42% in the pre-test. After the implementation of the "Who Am I?" intervention, their performance significantly improved to 78% (Proficient Mastery), as validated by the paired t-test ($p < 0.05$). This confirms that the intervention effectively addressed spelling and decoding difficulties in science vocabulary.

The structured spelling activities, clue-based identification, and multimodal supports (visual cards, peer tutoring, and guided spelling practice) proved highly effective in enhancing retention, comprehension, and usage of science terms. The steady progression from pre-test to mid-test and post-test results illustrates the intervention's strong impact on long-term vocabulary mastery.

Qualitative findings revealed that students perceived the "Who Am I?" strategy as engaging, enjoyable, and confidence-building. Learners reported reduced anxiety in spelling and pronunciation, greater willingness to participate in class discussions, and improved recall of scientific terms. Teacher observations and learner feedback consistently highlighted increased motivation and active participation.

LITERATURE CITED

Baker, D. L., Moradibavi, S., Liu, Y., Huang, Y., & Sha, H. (2025). Effects of Interventions on Science Vocabulary and Content Knowledge: A Meta-analysis. *Research in Science Education*, 1-19. https://doi.org/10.1007/s11165-025-10236-2

Balce, E. M. (2024). Vocabulary proficiency and reading comprehension of senior high school students: Basis for the development of supplementary learning material. International *Journal of Innovative Science and Research Technology, 9*(12), 192. https://www.ijisrt.com/paper/IJISRT24DEC132

Buro, W. C., Espinosa, D. L., Escandallo, J. C., Generalao, R. L., Muegna, K. J. R., & Cerna, C. B. Enhancing Students' Spelling Proficiency through the Use of Digital Applications: An Action Research Study. *International Journal of Multidisciplinary Educational Research and Innovation*, *4*(1), 631984. DOI: 10.64637/631984

Corpuz, J. M. M., Morales, A. N., Clarin, A. S., Dionio, B. B., & Cocolan, J. V. (2024). Studentsâ€™ Vocabulary Skills in Relation to their Reading Comprehension in Language Literature. *International Journal of Research and Innovation in Social Science*, *8*(10), 2137-2149. https://tinyurl.com/443ea3y6

Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative* (Vol. 7). Prentice Hall Upper Saddle River, NJ. https://tinyurl.com/3kc22b33

Department of Education. (2023). MATATAG K to 10 curriculum guide: Science (Grades 3-10). https://tinyurl.com/29yzzuyy

Diestro, D. (2023). Exploring students' performance using lingua franca i n science education: a study of grade ten students in Capiz, Philippines [version 1; peer review: 1 approved, 2 approved. doi: 10.12688/f1000research.141170.1

Fudhla, N., Solusia, C., & Oktoviandry, R. (2020, March). Context clues as a vocabulary learning strategy: A view of its implementation in EFL classroom. In *7th International Conference on English Language and Teaching (ICOELT 2019)* (pp. 83-87). Atlantis Press. DOI 10.2991/assehr.k.200306.014

Jolampong, C. T., Mosquete, J. K. A., Escandallo, J. C., Muegna, K. J. R., Generalao, R. L., Cerna, C. B., & Espinosa, D. L. (2025). Enhancing science vocabulary acquisition through augmented reality (AR) flashcards among Grade 3 learners. EPRA International Journal of Multidisciplinary Research, 11(6). https://doi.org/10.36713/epra22506

Kansizoglu, N., & Bekiroglu, N. (2025). The Effect of Vocabulary Development Interventions on Cognitive Outcomes of Vocabulary: A Meta-Analysis Study. *Journal of Pedagogical Research*, *9*(1), 123-148. https://eric.ed.gov/?id=EJ1470531

Leonen, C. A. (2025). Effectiveness of COSCIVOW (Contextualized Science Vocabulary Work-sheet) in The Level of Vocabulary Skills of Grade 10 Learner. *International Journal of Multidisciplinary: Applied Business and Education Research*, *6*(1), 201-207. DOI: https://doi.org/10.11594/ijmaber.06.01.13

Palines, K. M. E., & Cruz, R. A. O. D. (2021). Facilitating factors of scientific literacy skills development among junior high school students. *LUMAT: International Journal on Math, Science and Technology Education*, *9*(1), 546-569. DOI: https://doi.org/10.31129/LUMAT.9.1.1520

Recillo, J. C. R., Breva, J. A., & Sixta, D. V. (2023). Enhancing scientific literacy of Grade 9 students using MELCs-based science dictionary. Department of Education, City Schools Division of Biñan City. https://tinyurl.com/mrxhbeus

Sagosoy, M. J. R., Morga, M. M., & Pelino, E. S. (2025). Project volt: vocabulary opportunities and literacy through translanguaging. Department of Education Region IV-A Calabarzon City Schools Division of Biñan City. https://tinyurl.com/7tv9tz2a

VanUitert, V. J., Kennedy, M. J., Romig, J. E., & Carlisle, L. M. (2020). Enhancing Science Vocabulary Knowledge of Students with Learning Disabilities Using Explicit Instruction and Multimedia. *Learning Disabilities: A Contemporary Journal*, *18*(1), 3-25. https://eric.ed.gov/?id=EJ1264269

Xing, B., & Zhang, H. (2025). A study of the effect of multimodal input on vocabulary acquisition: Evidence from online Chinese language learners. *Language Teaching Research*, 13621688241313017. https://doi.org/10.1177/13621688241313017

Zhang, Y. (2024). Application of Multimodal Teaching in Junior High School English Vocabulary Instruction. *International Journal of Social Science and Education Research*, *7*(9), 104-111. https://doi.org/10.6918/IJOSSER.202409_7(9).0015