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Development and validation of Science Instructional Materials (SIMs) for the least learned competencies

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Abstract

Purpose: This study focused on developing and evaluating Science Instructional Materials (SIMs) to address the least-learned competencies among Grade 8 students, providing structured resources for learners struggling with key scientific concepts.

Research methodology: A research and development approach was employed, identifying the least learned competencies through summative assessments. The SIMs were designed based on these competencies and evaluated by science teachers, master teachers, and Learning Resource Management and Development System (LRMDS) members. The evaluation criteria included content quality, format, presentation, organization, and accuracy, with statistical analysis to examine differences in ratings.

Results: The SIMs received high ratings across all evaluation categories, with no significant differences in the assessments from science teachers, Master Teachers, and LRMDS members, indicating broad acceptance and reliability.

Conclusions: The findings showed that SIMs were highly rated, aligning well with instructional standards and classroom needs. While there were significant differences in ratings among evaluator groups, the overall acceptability was high, suggesting that the SIMs effectively addressed learning challenges, particularly in physics. Their structure, clarity, and adherence to curriculum standards were affirmed. Further validation is required in diverse educational contexts.

Limitations: This study was limited to a single public secondary school, which may affect the generalizability of the findings. Additional validation in various educational settings is needed.

Contribution: This study provides an evidence-based approach for developing instructional materials in science education, focusing on addressing learning gaps and supporting competency development.

Novelty: This study introduces SIMs specifically designed to enhance competencies identified as least learned, validated through expert evaluation aligned with curriculum standards.

Keywords: *Grade 8 Science, Learning Resource Validation, Least Learned Competencies, Research and Development, Science Instructional Materials*

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1. Introduction

Science education plays an essential role in the development of students' analytical and problem solving skills. However, understanding scientific concepts remains difficult because of their abstract nature,

complex theories, and need for logical reasoning (Janoušková, Pyskatá Rathouská, Žák, & Urválková, 2023). Global assessments have consistently revealed gaps in science proficiency, particularly in the Philippines. Results from the Programme for International Student Assessment (PISA) indicate that the country ranks among the lowest in science, mathematics, and reading, reflecting persistent challenges in student learning (Alinsunurin, 2021).

At the national level, public secondary schools face additional obstacles that limit the effectiveness of science instruction. Insufficient instructional resources, gaps in curriculum implementation, and constraints in teacher training contribute to students' struggles to acquire key competencies (Calo & De Vera, 2025). Despite ongoing efforts to strengthen science education, many students continue to show poor mastery of fundamental concepts, as shown in their summative assessment results. While various instructional materials exist, they often do not align with students' least-learned competencies, reducing their effectiveness in addressing learning deficiencies.

To address these concerns, the Department of Education (DepEd) has promoted the use of Strategic Intervention Materials (SIMs) to support struggling learners. However, in the Division of Sultan Kudarat, there is a lack of SIMs specifically designed for grade 8 science competencies, where students demonstrate low mastery. This gap demonstrates the need for instructional materials designed to address specific learning difficulties.

In response, this study focuses on developing and evaluating Science Instructional Materials (SIMs) for Grade 8 students. It identifies the least learned competencies, creates instructional materials aligned with these areas, and assesses their quality through evaluations from science teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members.

Ultimately, this study provides a structured approach to address learning gaps in science education. These findings may serve as a basis for improving instructional material development and adapting similar interventions to different educational settings.

1.1 Research Objectives

This study aimed to develop and validate Science Instructional Materials (SIMs) designed to address the least-learned competencies of Grade 8 students. Specifically, it seeks the following:

1. Identify the least learned competencies of Grade 8 students in science.
2. Assess the level of acceptability of the developed Science Instructional Materials (SIMs) among Science Teachers in terms of:
   2.1 Content,
   2.2 Format,
   2.3 Presentation and Organization, and
   2.4 Accuracy and Up-to-Date Information.
3. Evaluate the level of acceptability of the developed Science Instructional Materials (SIMs) among Master Teachers in terms of:
   3.1 Content,
   3.2 Format,
   3.3 Presentation and Organization, and
   3.4 Accuracy and Up-to-Date Information.
4. Determine the level of acceptability of the developed Science Instructional Materials (SIMs) among Learning Resource Management and Development System (LRMDS) members in terms of
   4.1 Content,
   4.2 Format,
   4.3 Presentation and Organization, and
   4.4 Accuracy and Up-to-Date Information.
5. Analyze whether there is a significant difference in the mean ratings given by Science Teachers, Master Teachers, and LRMDS members regarding the quality of the developed Science Instructional Materials (SIMs).

1.2 Research Hypothesis

This study examines the following null hypothesis at a 0.05 level of significance:

H_0: No significant difference exists in the mean ratings provided by Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members regarding the quality of the developed Science Instructional Materials (SIMs) based on content, format, presentation and organization, and accuracy and up-to-date information.

2. Literature Review

Science education plays a fundamental role in helping students analyze and apply concepts in real-world situations. However, several challenges hinder effective instruction, including difficulties in understanding abstract concepts, limited instructional materials, and gaps in curriculum implementation (Groenewald et al. 2023). Addressing these concerns requires well-developed learning resources to support comprehension and engagement.

2.1. Science Education and Learning Challenges

Science education fosters reasoning and problem-solving skills, allowing students to make informed decisions based on scientific principles (Smith et al., 2022). However, research has indicated that many students struggle with complex theories and abstract ideas. International assessments, such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), have consistently ranked the Philippines among the lowest-performing countries in science (Lapinid et al., 2022). These findings suggest that students face challenges in applying scientific concepts, which affects their overall academic performance.

Beyond performance issues in global assessments, studies within the Philippines have identified multiple obstacles to science education. Insufficient instructional materials, limited access to laboratory facilities, and a lack of professional development programs for teachers contribute to these difficulties (Calo & De Vera, 2025). Furthermore, science lessons often rely on traditional lecture methods, which may not effectively support student learning. Without appropriate teaching strategies and instructional resources, students may continue to experience difficulties mastering fundamental scientific principles (Ligado, Guray, & Bautista, 2022).

2.2. Least Learned Competencies in Science

Students often struggle with specific science topics that require strong conceptual foundations and higher-order thinking skills. Studies have identified force, motion, energy, and heat transfer as areas in which students demonstrate low mastery. These topics demand more than memorization because they involve real-world applications (Wijaya, Maryanti, Wulandary, & Irawan, 2022). However, many students find these concepts challenging because of their abstract nature. Without effective instructional materials and engaging learning experiences, students are less likely to develop a solid understanding of these topics.

Another factor affecting mastery is the teaching approach used in the classroom. Traditional lecture-based instruction may not always meet students' learning needs, particularly for topics requiring experimentation and hands-on activities (Ghimire, 2024). Research suggests that students learn more effectively when participating in problem-solving tasks, experiments, and collaborative discussions. The absence of instructional materials that align with these strategies further limits students' ability to grasp difficult scientific concepts (Zhai, 2023). This underscores the importance of instructional materials designed specifically to address competencies in which students struggle the most.

2.3. Development and Use of Science Instructional Materials (SIMs)

Instructional materials play a central role in supporting student learning, particularly in subjects that require conceptual understanding and problem-solving. The Department of Education (DepEd) introduced Strategic Intervention Materials (SIMs) to help students overcome learning difficulties in science and other subjects (Bonitez, 2021). These materials provide structured content, activities, and assessments designed to strengthen student engagement and comprehension (Fitrianto & Saif, 2024).

Research indicates that SIMs can enhance student performance by breaking down complex topics into manageable sections, making it easier for learners to process information.

In addition to simplifying difficult topics, SIMs incorporate various instructional strategies to accommodate different learning styles (Alabi, 2024). Many SIMs use visual aids, step-by-step explanations, and interactive tasks to encourage active participation. Studies have shown that students who use SIMs perform better in assessments than those who rely solely on traditional classroom instruction (Ramdani, Jufri, Gunawan, Fahrurrozi, & Yustiqvar, 2021). Teachers have also observed that these materials support lesson planning and make science more accessible to students (Haas et al., 2021). Given their effectiveness, SIMs serve as essential tools for addressing learning gaps in science education.

2.4. Evaluation of Instructional Materials

To ensure that instructional materials are effective, they must undergo a thorough evaluation process (Ruiz-Rojas, Acosta-Vargas, De-Moreta-Llovet, & Gonzalez-Rodriguez, 2023). Researchers suggest that four key factors should be considered when assessing learning resources: content, format, presentation, organization, and accuracy of information (Al-Adwan, Nofal, Akram, Albelbisi, & Al-Okoue, 2022). Content must align with curriculum standards and be appropriate for students' level of understanding. If the material does not match students' cognitive abilities, they may struggle to grasp the intended lessons (Tomlinson, 2023). Format focuses on structure and design, ensuring that materials are visually engaging and easy to follow (Santoso and Putra, 2021).

Presentation and organization influence how well students comprehend the material. Concepts should be arranged logically with a clear progression from basic to more advanced ideas (Karunarathna, Gunasena, De Alvis, & Jayawardana, 2024). Additionally, instructional materials must be error-free and contain the most current scientific information (Clark & Mayer, 2023). Studies emphasize the importance of involving multiple evaluators, such as Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members, to ensure that materials meet quality standards. Through careful evaluation of these aspects, instructional materials can provide an effective learning experience for students.

2.5. Research Gap

Despite ongoing efforts to improve science education, limited research exists on the development and validation of Science Instructional Materials (SIMs) targeting the least-learned competencies in grade 8 science. Existing studies have examined the use of instructional materials in general, but few have focused on resources designed for areas where students demonstrate the lowest levels of mastery (Wang et al., 2021). Consequently, teachers often rely on available materials that may not be tailored to their students' specific needs. This gap underscores the necessity for research focused on developing and assessing instructional materials that directly address learning difficulties in science.

3. Methodology

3.1 Research Design

This study utilized a Research and Development (R&D) design to develop and validate Science Instructional Materials (SIMs) targeting Grade 8 students' least-learned competencies. The R&D approach provides a systematic framework for designing instructional resources and assessing their effectiveness through expert review (Rachma & Muhlas, 2022).

The process commenced with an analysis of the students' summative assessment results to identify the competencies for which they exhibited the most difficulty. These findings have guided the development of SIMs aimed at strengthening students' understanding of key scientific concepts. Once created, the materials were evaluated by Science Teachers, Master Teachers, and members of the Learning Resource Management and Development System (LRMDS). The assessment covered aspects such as content alignment, structural organization, clarity of presentation, and accuracy and relevance of the information provided (J. V. Baron & Cruz, 2023; J. V. Baron & Robles, 2023).

This approach ensured that SIMs addressed specific learning needs while adhering to educational standards. Expert evaluation allowed for refinement of the materials to enhance their applicability and instructional value before they were introduced into classroom settings. (J. Baron, 2022; J. V. Baron, 2023).

3.2 Locale of the Study

This study was conducted at the Lutayan National High School, located in Barangay Tamnag, Municipality of Lutayan, Sultan Kudarat, Philippines. The school is a public secondary institution under the Division of Sultan Kudarat, which caters to both junior and senior high school students. It serves diverse populations of learners, including those from nearby rural communities.

Lutayan National High School was selected as the study site because of its reported challenges in grade 8 science performance, particularly in mastering key competencies. The school's Science Department provided data on students' least-learned competencies, which formed the basis for the development of instructional materials. Furthermore, the participation of Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members ensured a comprehensive evaluation of the developed Science Instructional Materials (SIMs).

3.3 Sampling Technique and Respondents

This study employed a purposive sampling technique to ensure that only qualified individuals evaluated the developed Science Instructional Materials (SIMs) (Robinson, 2024; Simpal & Robles, 2024). This approach allowed the selection of respondents with expertise in science education and instructional material assessment. The respondents were categorized into three groups: science teachers, master teachers, and Learning Resource Management and Development System (LRMDS) members.

Fifteen evaluators participated in the study. Five Science Teachers from Lutayan National High School were selected because they have direct experience teaching grade 8 science and are familiar with students' learning challenges. Additionally, five master’s teachers from various public secondary schools in the Division of Sultan Kudarat were included, given their advanced knowledge in science instruction and instructional material evaluation. Finally, five LRMDS members from the Division of Sultan Kudarat participated, as they were responsible for reviewing and approving learning materials for use in public schools. These respondents assessed the developed SIMs based on content, format, presentation and organization, accuracy, and up-to-date information, ensuring a comprehensive evaluation before potential classroom implementation.

3.4 Data Gathering Instrument

This study employed a standardized evaluation tool from the Learning Resource Management and Development System (LRMDS) to assess the acceptability of developed Science Instructional Materials (SIMs). The instrument measures four key criteria: content, format, presentation and organization, accuracy, and up-to-date information.

The evaluation tool included structured indicators for each criterion. Content was evaluated based on its alignment with learning competencies and appropriateness for Grade 8 students. The format focused on readability, layout, and visual presentation. Presentation and organization examined the logical sequencing of topics and clarity of explanations. Accuracy and up-to-date information ensured that the content was free of conceptual, factual, grammatical, and typographical errors.

A four-point Likert scale was used to rate the acceptability of the SIMs. The evaluators, consisting of Science Teachers, Master Teachers, and LRMDS members, provided assessments based on their expertise in science education and instructional material evaluation. The use of a standardized instrument ensured a systematic assessment process consistent with DepEd’s quality standards for learning resources.

3.5 Statistical Treatment

This study employed descriptive and inferential statistics to analyze the acceptability of the developed Science Instructional Materials (SIMs) based on evaluations from Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members.

Mean and standard deviation were used to determine the level of acceptability. The mean provided an overall measure of how the evaluators rated the materials in terms of content, format, presentation and organization, accuracy, and up-to-date information, while the standard deviation measured the consistency of responses among the evaluators.

To examine the differences in ratings among the three groups of evaluators, the Kruskal-Wallis test was used. This non-parametric test was used to determine whether significant differences existed in the assessments. A post-hoc pairwise comparison was also conducted to identify which groups differed in their evaluations.

These statistical treatments ensured a comprehensive evaluation of the developed SIMs, guiding necessary revisions to improve their effectiveness in addressing the least-learned competencies of Grade 8 students.

4. Results and Discussions

This section presents the findings based on the evaluation of the developed Science Instructional Materials (SIMs) and the analysis of Grade 8 students' least-learned competencies in science. The results offer insights into the difficulties students encounter in grasping essential scientific concepts and the acceptability of instructional materials designed to address these challenges. The discussion interprets the data and examines their implications for science teaching and learning.

4.1. Least Learned Competencies in Science 8

Determining the least learned competencies is necessary to address learning difficulties and refine instructional strategies. Recognizing the specific areas where students struggle allows for the creation of focused learning resources that support the comprehension and mastery of scientific principles. In this study, students' performance on the First Quarter Summative Test served as the basis for identifying the competencies they found most challenging. The assessment measured their understanding of the core physics concepts, including force, motion, energy, and heat transfer.

Table 1 provides a summary of the least learned competencies based on the students' assessment results.

Table 1. Least Learned Competencies of the Students in Science based on the First Quarter Summative Test

No.	Competency	Items	No. of Correct Responses	No. of Mistake Responses	Percentage of Correct Responses	Remarks
1	Conducting a controlled experiment to examine how temperature influences the speed of sound (S8FE-Ie-25).	41-47	205	172	54.38%	Average
2	Explaining the	48-50	171	208	44.36%	Least Learned

	distinction between heat and temperature by analyzing molecular behavior (S8FE-Ig-29).					Competency
3	Identifying the differences between potential energy and kinetic energy (S8FE-Id-22).	34-40	154	223	40.85%	Least Learned Competency
4	Exploring how the magnitude of force and an object's mass affect changes in its motion (S8FE-Ia-15).	1-20	140	234	37.10%	Least Learned Competency
5	Understanding that when one object applies force on another, an equal force is exerted in return (S8FE-Ia-16).	21-33	132	245	35.01%	Least Learned Competency
		TOTAL= 50			**42.56%**	**Least Learned Competency**

The results in Table 1 indicate that Grade 8 students encountered difficulties in key physics-related competencies, with an overall correct response rate of 42.56 percent. Four out of five competencies had scores below 50 percent, classifying them as least learned. The lowest-performing competency, which involves inferring that when a body exerts a force on another, an equal amount of force is exerted back on it, recorded only 35.01 percent correct responses. This suggests challenges in understanding Newton's Third Law of Motion and its practical applications. Similarly, differentiating between potential and kinetic energy had a 40.85 percent accuracy rate, indicating difficulty in distinguishing energy forms and their roles in physical systems.

While all competencies require improvement, one competency—investigating the effect of temperature on the speed of sound through fair testing—had a 54.38 percent accuracy rate, categorizing it as average. Despite this relatively high score, nearly half of the students still struggled with this topic, highlighting the need for additional instructional support. The competencies related to force and motion, including

the relationship between applied force and mass and differentiating heat from temperature, also had scores below 45 percent, reflecting difficulties in conceptualizing fundamental physics principles.

The low performance in these competencies suggests that traditional lecture-based methods may not be sufficient to facilitate students' understanding of abstract scientific concepts (Rianti, Gunawan, Verawati, & Taufik, 2024). Science Instructional Materials should incorporate hands-on activities, simulations, and real-world problem-solving exercises to provide students with practical applications of these topics. Concepts related to Newton's Laws of Motion, energy transformation, and heat transfer can be reinforced through experiments, interactive models, and inquiry-based learning strategies that encourage active participation.

These findings underscore the importance of formative assessments in science instruction. Regular assessments through diagnostic tests, collaborative learning, and guided discussions can help identify misconceptions early, allowing teachers to adjust their instructional approaches accordingly (Molin et al., 2022). Moreover, the integration of visual learning aids and structured problem-solving exercises may enhance students' ability to grasp and apply scientific concepts (Alabi, 2024).

Overall, the findings establish the need for structured instructional materials that address the least-learned competencies (Molin et al., 2022). The Science Instructional Materials developed in this study aim to respond to this concern by providing clear explanations, structured activities, and interactive learning approaches tailored to the learning needs of Grade 8 students. Continuous refinement of these materials based on student performance and feedback will be essential for strengthening science instruction in public secondary schools.

4.2. Level of Acceptability of The Developed Science Instructional Materials (Sims) Among Science Teachers

Science teachers play a vital role in facilitating student learning by making their evaluations of instructional materials highly significant. Their feedback offers valuable perspectives on whether Science Instructional Materials (SIMs) align with lesson objectives, reinforce key concepts, and improve students' comprehension. Since they implement these materials in actual classroom settings, their assessment helps determine the extent to which SIMs effectively address the least learned competencies.

Table 2 presents the summarized results of the science teachers' evaluation regarding the acceptability of the developed SIMs.

Table 2. Summary of the Level of Acceptability of the Developed Science Instructional Materials (SIMs) among Science Teachers

Item	Mean	SD	Description
Content	3.91	0.08	Very High
Format	3.98	0.03	Very High
Presentation and Organization	4.00	0.00	Very High
Accuracy and Up-To-Datedness	4.00	0.00	Very High
Overall Mean	**3.97**	**0.04**	**Very High**

The findings in Table 2 reveal that the Science Instructional Materials (SIMs) developed in this study were rated with a very high level of acceptability across all assessed criteria, achieving an overall mean score of 3.97. This indicates that the materials align well with the instructional standards and are considered highly appropriate for classroom implementation.

Among the four evaluation criteria, the highest possible mean score of 4.00 was recorded for both presentation and organization, as well as accuracy and up-to-date content. These results suggest that instructional materials are structured in a clear and coherent manner, while ensuring factual accuracy and relevance. Additionally, the format of the SIMs received a very high rating, with a mean score of

3.98, indicating that the design, readability, and visual elements were well suited for student engagement. The content aspect, which attained a mean of 3.91, was also rated very high, confirming that the materials effectively addressed the required competencies and were aligned with the intended curriculum.

The consistently high ratings suggest that the developed SIMs are effective instructional tools for addressing the least learned competencies in science. Strong content evaluation indicates that the materials provide clear and relevant explanations consistent with the curriculum (Wang et al., 2021). Additionally, the high ratings in presentation and organization highlight that the materials follow a logical sequence, making lesson delivery more structured and comprehensible for both teachers and students. The near-perfect rating for format further suggests that visual components and layout contribute to enhanced engagement and understanding (Irasuti & Bachtiar, 2024).

Given this positive assessment, the developed SIMs can be integrated into science instruction as supplementary teaching resources. However, continuous refinement based on classroom implementation and student feedback can further strengthen their effectiveness (Maier and Klotz 2022). Future instructional material development should explore additional activities and assessment tools to accommodate diverse learning needs.

4.3. Level of Acceptability of The Developed Science Instructional Materials (Sims) among Master Teachers

Master Teachers play an essential role in evaluating instructional materials due to their extensive experience in curriculum implementation, lesson planning, and student learning assessment. Their evaluation ensures that the developed Science Instructional Materials (SIMs) adhere to academic standards, align with prescribed learning competencies, and provide effective support for instruction. Their assessment helps determine the suitability of materials based on content, structure, and overall quality.

Table 3 presents a summary of the acceptability ratings of the developed SIMs as evaluated by Master Teachers.

Table 3. Summary of the Level of Acceptability of the Developed Science Instructional Materials (SIMs) among Master Teachers

Item	Mean	SD	Description
Content	**3.71**	**0.17**	Very High
Format	**3.76**	**0.34**	Very High
Presentation and Organization	**3.80**	**0.16**	Very High
Accuracy and Up-To-Datedness	**3.80**	**0.19**	Very High
Overall Mean	**3.77**	**0.14**	**Very High**

The results in Table 3 show that the Science Instructional Materials (SIMs) received a very high level of acceptability from Master Teachers, with an overall mean of 3.77. This indicates that the materials were well organized, aligned with academic standards, and appropriate for classroom instruction.

Among the four evaluation criteria, presentation and organization, as well as accuracy and up-to-date, both had the highest mean rating of 3.80. This suggests that the materials followed a clear structure and contained reliable current information. The format of the SIMs received a mean rating of 3.76, implying that layout, readability, and design effectively supported content delivery. The content was rated at 3.71, which, although still classified as very high, was the lowest among the four areas. A slightly lower content score may indicate areas for refinement, such as strengthening explanations, incorporating more examples, or improving alignment with instructional goals.

These findings suggest that the developed SIMs can serve as effective instructional resources in science education (Cooper 2023). The high ratings in presentation and organization confirm that the sequence of topics and lesson progression are clear, making the materials easier to use in teaching. The strong evaluation of accuracy and up-to-date knowledge ensures that students receive fact-based scientific knowledge, which is fundamental to maintaining instructional quality.

Although the materials were highly rated across all criteria, the slightly lower content score suggests potential areas for improvement, such as expanding the topic coverage or including more real-world applications. Future revisions may also integrate additional hands-on activities and explanations to enhance content effectiveness. Furthermore, pilot testing of the materials in classroom settings may help determine how they can be refined to better support student learning (Nicholson, 2021).

4.4. Level of Acceptability of The Developed Science Instructional Materials (Sims) among Learning Resource Management and Development System (LRMDS) Members

Assessment of instructional materials by Learning Resource Management and Development System (LRMDS) members ensures that they meet established quality standards for educational use. These evaluators examined the materials based on their alignment with the curriculum requirements, accuracy of content, and overall instructional effectiveness. Their evaluation provides essential feedback on the suitability of the developed Science Instructional Materials (SIMs) for classroom use.

Table 4 presents a summary of the level of acceptability of the developed SIMs as evaluated by LRMDS members.

Table 4. Summary of the Level of Acceptability of the Developed Science Instructional Materials (SIMs) among LRMDS Members

Item	Mean	SD	Description
Content	3.80	0.45	Very High
Format	3.77	0.44	Very High
Presentation and Organization	3.79	0.40	Very High
Accuracy and Up-To-Datedness	3.79	0.44	Very High
Overall Mean	**3.79**	**0.41**	**Very High**

The results in Table 4 show that Science Instructional Materials (SIMs) received a very high level of acceptability from Learning Resource Management and Development System (LRMDS) members, with an overall mean of 3.79. This indicates that the materials met the instructional quality standards and were considered appropriate for classroom use.

Among the four evaluation criteria, the content received the highest rating of 3.80, suggesting that the materials effectively addressed the required learning competencies. Presentation and organization, along with accuracy and up-to-date, both received a mean rating of 3.79, indicating that the lesson flow was logical and that the information provided was reliable. The format of the materials obtained the lowest mean score at 3.77, although still classified as very high, implying that minor refinements could enhance the design and layout.

These ratings suggest that the developed SIMs align with established learning resource standards, making them suitable for science instruction. A high content rating confirms that the materials provide essential subject knowledge and adhere to curriculum requirements (Marougkas, Troussas, Krouska, & Sgouropoulou, 2023). The ratings for presentation and organization indicate that the materials follow a structured approach that supports effective teaching and learning (Ruiz-Rojas et al., 2023).

Although all aspects received very high ratings, the slightly lower mean for format suggests that improvements in the visual layout, design consistency, or accessibility features may further strengthen the materials. Future revisions may consider incorporating more interactive elements, enhanced

graphics, or improved navigation features to optimize usability. Conducting field tests in various classroom settings may also provide additional perspectives on refining materials for better instructional support (Porat, Shamir-Inbal, & Blau, 2023).

4.5. Significant Difference in the Mean Ratings Given by Science Teachers, Master Teachers, and LRMDS Members Regarding the Quality of the Developed Science Instructional Materials (SIMs)

Assessing Science Instructional Materials (SIMs) from multiple perspectives allows for a thorough evaluation of their effectiveness, relevance, and usability. Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members provided assessments based on content, format, presentation and organization, accuracy, and up-to-datedness. While all groups rated the materials highly, differences in their evaluations were examined to determine whether significant variations existed in their mean ratings.

Table 5 presents a summary of the statistical test results on the differences in the mean responses of the three evaluator groups.

Table 5. Differences in the Mean Response of the Science Teachers, Master Teachers, and LRMDS Members on the Developed Science Instructional Materials (SIMs) Quality

Indicators	Mean	H-value	p-value	Remark
Science Teacher	3.97	6.845	0.0326	Significant
Master Teacher	3.77			
LRMDS Member	3.79			

**Tested at 0.05 level of significance*

The results in Table 5 show a significant difference in the mean ratings provided by Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members regarding the acceptability of the developed Science Instructional Materials (SIMs) ($H = 6.845$, $p = 0.0326$). Since the p-value is below the significance level of 0.05, this indicates that at least one group evaluated the materials differently from the others.

Among the three groups, Science Teachers assigned the highest mean rating of 3.97, suggesting that they found the materials highly suitable for classroom instruction. LRMDS members and Master Teachers provided slightly lower ratings, with mean scores of 3.79 and 3.77, respectively. Although all ratings fell within the very high category, these differences suggest variations in how the groups assessed the quality and instructional value of the materials.

The significant variation in ratings may indicate that Science Teachers, being directly involved in classroom instruction, found the materials well suited for addressing student learning needs. In contrast, Master Teachers and LRMDS members may have applied more stringent criteria, considering factors such as broader curriculum alignment and instructional effectiveness.

These findings suggest that additional refinements to SIMs could further address specific concerns raised by evaluators. Revisions may focus on content depth, instructional strategies, and alignment with curriculum standards to ensure that materials engage students while meeting established quality benchmarks (Wang et al. 2021). Pilot testing in different classroom settings may also provide further data on how materials can be improved to better support diverse teaching and learning environments (Ng, Tan, & Leung, 2024).

5. Conclusion

5.1 Conclusion

This study evaluated the acceptability of the developed Science Instructional Materials (SIMs) based on the assessments of Science Teachers, Master Teachers, and Learning Resource Management and Development System (LRMDS) members. The results indicated that the SIMs received consistently high ratings across all evaluation criteria, confirming their appropriateness for addressing the least-learned competencies in Grade 8 Science.

Although all evaluator groups acknowledged the instructional value of the materials, variations in their assessments suggested differences in perspectives. Science Teachers assigned the highest ratings, likely due to their direct engagement in classroom instruction. In contrast, Master Teachers and LRMDS members appeared to apply more stringent standards, particularly concerning content alignment, instructional design, and accuracy.

These findings suggest that the developed SIMs serve as effective instructional tools for supporting science education. However, refinements in content, format, and presentation may further enhance students' alignment with curriculum expectations and accommodate their diverse learning needs. Their high acceptability indicates the potential for broader application in science instruction to aid students in mastering key competencies.

5.2 Limitations

This study was limited to the development and validation of SIMs designed to address the least-learned competencies of Grade 8 students in a single public secondary school. The evaluation focused exclusively on the perspectives of Science Teachers, Master Teachers, and LRMDS members based on predetermined criteria. However, this study did not extend to actual classroom implementation, which could have provided additional insights into their effectiveness in enhancing students' learning outcomes.

Furthermore, this study was conducted within the Division of Sultan Kudarat, which may limit the generalizability of the findings to other educational contexts. Differences in curriculum implementation, teaching methodologies, and student proficiency levels across schools may influence the effectiveness of SIMs. Future studies may benefit from testing these materials across multiple schools and incorporating student performance data to assess their impact on learning.

5.3 Recommendations

Further refinement of the SIMs is recommended to enhance their effectiveness in addressing the least-learned competencies of Grade 8 students. Adjustments to content depth, instructional strategies, and activity design may strengthen their alignment with curriculum standards and better cater to diverse student learning needs. Additionally, implementing SIMs in classroom settings will provide a more comprehensive evaluation of their impact on student performance.

Conducting experimental research to assess the effectiveness of SIMs in improving learning outcomes is suggested. A comparative study involving students using SIMs and those taught through conventional methods could generate measurable data on their instructional value. Expanding the validation process to include multiple schools and a wider group of educators would offer a more holistic assessment of these materials. Gathering student feedback can provide valuable insights into usability and engagement. Future research may explore integrating technology-based learning tools to supplement SIMs and further enhance student interest in science education.

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