SCIENCE REVIEW MATERIALS (Sci-ReMs) FOR GRADE 3 LEARNERS

By

1*Anna Marie L. Abes, 2Andrian A. Dela Cruz

1Faculty Department of Education Schools Division of Ilocos Norte Badoc District, Gabut ElementarySchool Badoc, 2904 Philippines

2Faculty Mariano Marcos State University, College of Teacher Education, Laoag Campus, 2900, Philippines

Corresponding Author: annamarieabes@gmail.com

Abstract

This study presents the development and validation of a Science Review Materials (Sci-ReMs) aimed at equipping and preparing Grade 3 learners with essential skills and competencies in the different branches of science namely matter;living things and their environment;force, motion and energy; and earth and space for successful examination experiences. Employing a descriptive research design using Research and Development (R&D) methodology, the level of mastery of the learners from eight elementary schools classified as last mile schools in the Schools Division of Ilocos Norte was described. Likewise, the level of validity of the developed Sci-ReMs was described using mean. Five science experts were tapped to validate the Sci-ReMs using the DepEd Evaluation Rating Sheet for Print Resources. Findings indicate significant deficiencies in learners' understanding across science disciplines, particularly in matter classification, living things and their environment concepts, force, motion and energy principles, and earth and space phenomena. Consequently, the development of Sci-ReMs emerged as a crucial intervention measure, rated valid across content, format, presentation, organization, accuracy, and up-to-datedness. The study concludes that Grade 3 learners require targeted interventions to bolster scientific skills for successful test outcomes, with Sci-ReMs standing as a valid tool for this purpose. The Sci-ReMsare aligned with Instructional Scaffolding Theory, bridging cognitive gaps through structured assistance, and scaffolding strategies, offering step-by-step guidance to enhance scientific proficiency and confidence. Thus, Sci-ReMs may serve as a scaffold for science learning, providing tailored support to address unmastered competencies and potentially improve examination performance.

Keywords: DepEd Evaluation Rating Sheet for Print Resources, Last Mile Schools, Science Review Materials (Sci-ReMs).

1. INTRODUCTION

In the contemporary world, science is a vital learning discipline since most of the important issues nowadays call for scientific solutions. Early exposure of young children in the world and wonders of science may help them to solve problems applying scientific solutions.

According to Barredo and Joan (2014), the inclusion of science in school curricula aimed to help Filipino learners reach the highest degree of scientific literacy, enabling them to successfully engage as members of contemporary society.However, despite its importance, many learners struggle with the subject and perform poorly in the different science examinations. Several studies have pointed out reasons on the poor examination performance of learners in science such as lack of interest, ineffective teaching methods, language barriers, and the lack of prior knowledge of science.

Results of the local and international constructs revealed the unsatisfactory performance of Filipino learners in science (Orongan et al., 2019; Sadera et al., 2020). Data from the different international assessments such as International Learning ScalesAssessment (ILSA), Programme for International Assessment (PISA), and the Trends in International Mathematics and Science Study (TIMSS) show the poor status of the country's next generation in the area of science (Behiga, 2022; Orbeta, 2020).

InPISA 2022, the country ranked 77th out of 81 countries globally in science with scores of 373 approximately 120 points lower than average scores conducted by the Organization for the Economic Cooperation and Development (OECD) countries in the areas of mathematics, reading, and science (Delos Santos et al., 2021). Moreover, in 2019, among the 58 participating nations during the TIMSS assessment, the country was assessed as one of the lowest performing nations in the area of science with low international benchmark scale (Mullis et al., 2020). Thirteen percent of Filipino learners belonged to low benchmark as demonstrated on their limited understanding of scientific concepts and knowledge of foundational science facts, while 87% did not even reach this level.

On the other hand, the results of the National Achievement Test (NAT), show similar trend on the Filipino learners' science performance. The NAT is a series of exams taken by Grades 3, 6, 10 and 12 learners in the Philippines. This assessment identifies the academic levels, strengths, and weaknesses of learners in five learning area including science (Embang et al., 2022). Local studies revealed that aside from mathematics, science continues to be the most difficult field of study in basic education in the Philippines as revealed in their previous NAT results (Batomalaque, 2019). As explained in the study of Villarta et al. (2021), the poor performance in written-based examinations of learners is associated with the learners' poor science concepts.

Scholars in the field of education determined other factors that might trigger poor science performance of learners during examinations. Their findings revealed that poor examination performances of learners are attributed to a lack of science culture, flaws in the school curriculum, the teaching learning process, instructional resources, teacher training, and the lack of preparation before taking the examination which is considered in this study (Digal & Walag, 2019; Palines & Cruz, 2021; Salari & Sepahi,2021).

Considering the lack of preparation prior to taking an examination as a factor which explains the poor preparation in reviewing the relevant concepts they learned or the material given to them for the examination, findings of studies revealed negative consequences of lack of preparation before taking the examination. According to Cepeda et al. (2006) cramming or last-minute studying leads to shallow learning and minimal retention of material. Insufficient preparation increases stress and anxiety levels before and during the exam. This can negatively impact concentration, memory recall, and overall performance. When not adequately prepared, Mayer (2014) reiterated that learners may have an incomplete understanding of the subject matter and application of concepts and critical thinking which are pivotal to ensure good performances during examinations.

To help learners ace their examination experience, Song (2018) suggested that they should take and review notes before taking examination. This has a significant benefit on test performance which can contribute in having excellent examination test. This corroborates with the findings of Kobayashi (2006) that note taking and reviewing have positive effects on the learning of lower academic level learners particularly in taking during examinations.

According to Dunlosky et al. (2013), effective note-taking and reviewing before an examination require good review material. Having high-quality review and well-organized review material can significantly improve exam performance. A study by Karpicke and Blunt (2011) demonstrated that active retrieval practice, which is facilitated by good review materials, leads to better long-term retention of information and improved performance on examinations. Without review materials, Dunlosky et al. (2013) opined thatlearners may not have the opportunity to practice the types of questions that are likely to appear on the exam. This can make it difficult for them to develop the skills and knowledge required in preparation for examinations.

As reiterated in the study of Rogayan and Dollete (2019), educators face significant hurdles in effectively conveying certain scientific concepts and principles, primarily due to the shortage of pertinent, adaptable, and research-based educational materials. As pointed out by Jalmasco (2014), the absence of science resources is evident in the subpar quality of fundamental science education, as evidenced by the underwhelming achievement scores of Filipino students in various assessments as discussed earlier. Moreover, there is a notable deficiency in instructional materials that align with the desired competencies.

Due to the difficulties caused by the scarcity of educational resources, educators are compelled to develop appropriate materials that cannot only enhance learning experiences and prepare learners for exams but also address the predicament caused by the scarcity of learning resources in the country (Rogayan & Dollete, 2019). In response to the Sustainable Development Goal No. 4 on Quality Education, the development of the Science Review Materials (Sci-ReMs), is tailored to enrich Grade 3 learnersunderstanding of science. By understanding abstract scientific concepts across disciplines, developed Sci-ReMs aimed to prepare learners with the essential tools to navigate examinations confidently.

2. Objectives of the Study

This study developed a Science Review Materials (Sci-ReMs) to prepare Grade 3 learners during examination.

Specifically, it sought to answer the following questions:

1. What is the level of mastery of learners along
    1.1 matter;
    1.2 living things and their environment;
    1.3 force, motion and energy; and
    1.4 Earth and space?

2. What review materials can be developed for Grade 3 learners in their NAT based on the least mastered competencies?

3. How valid is the developed Sci-ReMs in terms of
    3.1 content;
    3.2 format;
    3.3 presentation and organization; and
    3.4 Accuracy and up-to-datedness?

3.   Research Methodology

3.1 Research Design

This study utilized the descriptive research design using the Research and Development (R & D) methodology. It is a descriptive that described the level of competencies of the learners in matter; living things and their environment; force, motion and energy; and earth and space.

Likewise, it described the level of validity of the developed Science Review Materials (Sci-ReMs). Also, this study follows the three stages in the R & D process: planning stage, development and validation stage, and final stage in the development of the Sci-ReMs. The schematic diagram shown in Figure 2 shows the steps in the development and validation of the Sci-ReMs for Grade 3 learners. The planning stage determined the level of competency in the four areas of Science along matter; living things and their environment; force, motion and energy; and earth and space which was used as basis in the development and validation stage of the Sci-ReMs. After which, the results of validation process were considered to improve the review materials in the final stage.

PLANNING STAGE
- Identification of the learners' level of mastery
- Administration of the summative test in science

DEVELOPMENT AND VALIDATION STAGE
- Desining the Sci-ReMs
- Development and Validation of the Sci-ReMs
- Final Revision of the Sci-ReMs

FINAL STAGE
- Final Revision and Production of the Sci-ReMs
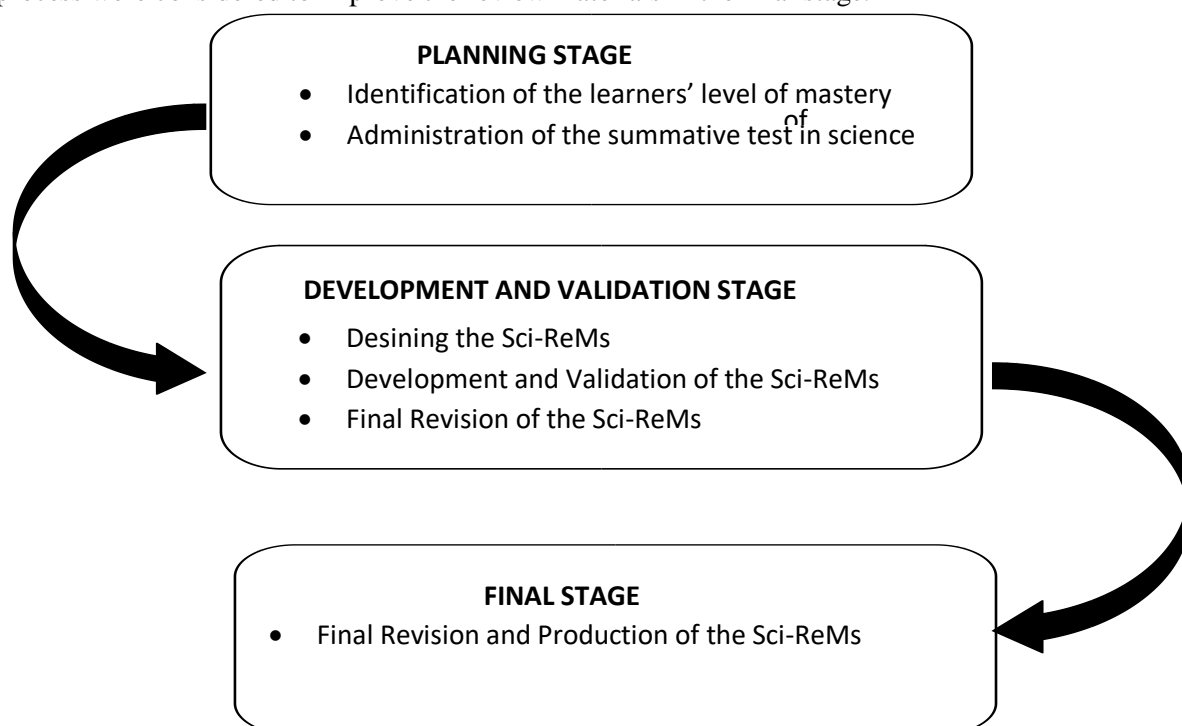
Figure 2. Schematic Diagram Showing the Steps in the Development and Validation of the Sci-ReMs.

3.2 Research Locale

This study included the eight schools identified as last mile schools of the Schools Division of Ilocos Norte (SDOIN). As mentioned in the study of Lagura (2023), these schools are situated in the four units of the SDOIN.

These schools are suited in the present undertaking because of their unique challenges and characteristics. These schools operate multi-grade classes, cater to a low population, and have limited staff. The infrastructure is improvised, with fewer than four classrooms, lack of electricity, and lack of funding for renovations which proved to influence the ability of learners in taking examinations.

3.3. Research Participants and Sampling Procedure

This study involved two groups of respondents. The first group includes a total of 42 learners enrolled in the eight elementary schools classified as last mile schools in the four units in SDOIN enrolled for the school year 2023-2024. Using total enumeration, the Grade 4 learners took the summative test.

On the other hand, the second group of respondents is composed of experts in science from SDOIN. Using the purposive sampling, the researcher identified five experts who assessed the Sci-ReMs in terms of content, format, presentation and organization, and accuracy and up-to-datedness. The criteria for choosing validators are as follows: 1) have at least five years of experience teaching science; 2) have expertise in developing instructional materials; and 3) those who were willing to engage in the study.

3.4 Research Instruments

This study utilized two sets of research tools. In describing the level of mastery of the Grade 4 learners, the adopted 40-item summative test thoughtfully crafted by the master teachers of SDOIN was used. A Table of Specifications (TOS) was prepared to ensure equal representation of items based on the learned competencies per area of science. The items that were identified as "not mastered" and "least mastered" were the bases in the development of Sci-ReMs which was submitted for content validation.

The rating scale below was used in describing the level of mastery of the Grade 4 learners.

Range of MeansDescriptive Interpretations (DI)

6 and below correct items	Not Mastered (NoM)
7 correct items	Least Mastered (LeM)
8 correct items	Nearly Mastered (NM)
9 and above correct items	Mastered (M)

Using the adopted DepEd Evaluation Rating Sheet for Print Resources, the content validity of the Sci-ReMs was determined in terms of content, format, presentation and organization, and accuracy and up-to-datedness ranging from 4 Very Much Valid(VMV) to 1- Sightly Valid (SV) which is shows below.

Range of MeansDescriptive Interpretations (DI)

3.51-4.00	Very Much Valid (VMV)
2.51-3.50	Much Valid (MV)
1.51-2.50	Valid (V)
1.00-1.50	Slightly Valid (SV)

3.5 Data Collection

In the conduct of the study, the researcher submitted all the required forms and documents to the University Research Ethics Review Board. When the result was released and the paper successfully passed the ethics review, the researcher asked permission from the schools division superintendent of SDOIN to conduct the study. After which, the researcher prepared the validated 40-item summative test in science to identify the level of mastery of the Grade 4 learners enrolled in the identified eight last mile schools in the four units of the SDOIN.

After obtaining approval, the researcher personally administered the test to the respondents and collected them afterward. The participants' involvement in the study lasted only an hour during the test administration. Adhering to the No Disruption Policy of the DepEd, the researcher coordinated with the public schools district supervisor and the concerned school heads to schedule the test administration. The entire process, including test administration and retrieval, spanned eight days across the eight participating schools.

The collected data were analyzed and utilized as basis in designing and developing the Sci-ReMs. The material was submitted to five science experts for content validation. All revisions, corrections, and remarks were incorporated into the final copy of the Sci-ReMs. All the gathered data were tabulated, analyzed, and interpreted with the help of the researcher's adviser and statistician.

3.6 Data Analysis

To determine the level of mastery in the different areas of science along matter; living things and their environment; force, motion and energy; and earth and space, frequency counts, percentages and mean were used. Their level of mastery was assessed using the 4-point Likert scale below adopted from the DepEd:

Range of Means	Descriptive Interpretations (DI)
6 and below correct items	Not Mastered (NoM)
7 correct items	Least Mastered (LeM)
8 correct items	Nearly Mastered (NM)
9 and above correct items	Mastered (M)

Also, mean was utilized to determine the level of validity of the Sci-ReMs in terms of content, format, presentation and organization, and accuracy and up-to-datedness. The 4-point Likert scale was used to assess its validity:

Range of Means	Descriptive Interpretations (DI)
3.51-4.00	Very Much Valid (VMV)
2.51-3.50	Much Valid (MV)
1.51-2.50	Valid (V)
1.00-1.50	Slightly Valid (SV)

4. Results and Discussion

This section presents the data on the level of mastery of the Grade 4 learners in the four areas of science along matter, living things and their environment, force, motion and energy, and earth and space.

**Summary of theLearners'
Level of Mastery along
The Four Areas of Science**

Table 1 Total MPS on the level of mastery of the learners along the four areas of science

Areas of Science	MeanPercentage Score (MPS)	Descriptive Interpretations (DI)
Matter	5.17	**NoM**
Living Things and Their Environment	3.29	**NoM**
Force, Motion and Energy	4.88	**NoM**
Earth and Space	4.55	**NoM**
Average MPS	**4.47**	**NoM**

Legend:

Range of Means	Descriptive Interpretations (DI)
6 and below correct items	Not Mastered (NoM)
7 correct items	Least Mastered (LeM)
8 correct items	Nearly Mastered(NeM)
9 and above correct items	Mastered (M)

Table 1 shows the competency levels of learners in matter, living things and their environment, force, motion and energy, and earth and space, with an average MPS result of 4.47, indicating significant challenges in mastering these subjects. The low total MPS result indicates that incoming Grade 4 learners have not yet fully grasped all science concepts, suggesting a tendency to struggle with higher science concepts.

Of particular concern is the performance of learners in living things and their environment, with the lowest MPS of 3.29 among the science branches. This mirrors the findings of previous research by

Santos et al. (2021), underscoring the persistent challenges students face in grasping living things and their environment concepts. The development of Sci-ReMs presents an opportunity to address these deficiencies proactively by incorporating engaging and interactive learning materials specifically tailored to enhance students' understanding of living things and their environment and other scientific disciplines.

The need for targeted interventions to improve students' understanding and mastery in science education highlights the findings of this study. Addressing the gaps is crucial for academic growth and achievement of the learners in different areas of science. Failure to master science competencies in earlier grades can significantly impact future performance in science courses. This lack of knowledge creates danger leading to knowledge gaps (Hulme, 2018), hindering understanding of advanced topics and effective application of new concepts in science education.

Furthermore, the lack of interest can lead to discouragement in science-related activities (Tytler & Osborne, 2011), resulting in lower examination results and poor achievement levels in science courses. According to Çimer (2012), learning difficulties are primarily caused by students' attitudes, learning habits, and resource scarcity, leading to negative attitudes and disinterest in science particularly in living things and their environment. More so, learners' difficulties in living things and their environment classes were partly caused by poor study habits, which included regular study sessions, material reviews, and constant work on living things and their environmental questions.

Fisher et al. (2021) found that prior knowledge helps learners perform better academically in school particularly in science. Building on prior knowledge is another crucial aspect for success in higher-level science courses. Note-taking strategies and review of note materials are linked to improve prior knowledge which could yield to better test scores (Olmos & Lusung-Oyzon, 2008). Likewise, practical work and increased living things and their environment questions in exams may also improve learners' written performances (Cimer, 2012).

Level of Validity of the Science Review Materials (Sci-ReMs)
This part presents the results of the validation of the of the Science ReviewMaterials (Sci-ReMs) for Grade 3 learners.

Summary of the Validitation Results
Of the Developed ScienceReview
Materials (Sci-ReMs)

Table 2 Overall Mean of the Validity Results of the Developed Science Review Materials (Sci-ReMs)

Components	Mean	DI
Content	3.93	VMV
Format	3.69	VMV
Presentation and Organization	3.88	VMV
Accuracy and Up-to-datedness of Information	4.00	VMV
Overall Mean	**3.88**	**VMV**

Legend

Range of Means	Descriptive Interpretations (DI)
3.51-4.00	Very Much Valid (VMV)
2.51-3.50	Much Valid (MV)
1.51-2.50	Valid (V)
1.00-1.50	Slightly Valid (SV)

Table 2 explains the overall mean score of the validation results of the developed Sci-ReMs in the four components along content, format, presentation and organization, and accuracy and up-to-datedness of information

The validity results of the developed Sci-ReMs offer crucial insights into its effectiveness and suitability as a review material for Garde 3 learners. With a high mean score of 3.93 in the content component, it is evident that the material aligns well with educational objectives and caters effectively to the needs of the target users. This indicates its relevance, appropriateness, and inclusivity in addressing the curriculum goals and developmental levels of the learners. While the format component scored slightly lower at 3.69, falling within the valid range, it signifies that the Sci-ReMs demonstrate good quality prints, illustrations, and layout. However, there might be areas for improvement to enhance its usability and accessibility.

The high mean score of 3.88 in presentation and organization underscores the material's ability to engage readers with clear and logical content flow, facilitating comprehension and retention. Additionally, the perfect score of 4.00 in accuracy and up-to-datedness of information highlights the material's reliability and credibility, being free from errors and containing current information. These validation results collectively imply that the Sci-ReMs serve as a valuable educational resource, supporting meaningful learning and reviewing experiences for the learners.

As pinpointed by Mutiara et al. (2007), all learning materials must undergo a systematic quality assurance process at every stage of design, development, and production to guarantee high-quality materials for students to use in their autonomous, independent, structured, and guided learning activities throughout their distance learning journey.

5. Findings

The learners did not master concepts related to matter particularly in classifying objects and materials as solid, liquid, and gas based on observable characteristics. Additionally, they did not master living things and their environment concepts, such as sense organ functions and animal parts identification. In terms of force, motion and energy, the learners did not master the describing position and explaining the uses of light, sound, heat, and electricity in everyday life. Lastly, they did not master concepts about earth and space particularly weather changing conditions and natural phenomena observed in the sky.

The identified least mastered competencies of Garde 3 learners necessitate focused intervention measures to equip and prepare them with the necessary science skills for a successful test experience. To address this concern, the Science Review Materials (Sci-ReMs) were developed following the R&D methodology.

The developed Sci-ReMs were rated valid in terms of content (3.93), format (3.69), presentation and organization (3.88), and accuracy and upto-datedness of information (4.00). The developed Sci-ReMs were generally rated valid as indicated by the overall weighted mean of 3.88.

6. Conclusions

The low level of mastery results of the summative test in science, necessitates an intervention measure to develop the requisite scientific skills for a successful examination journey.Moreover, the developed Science Review Materials (Sci-ReMs) are valid. Thus, the review materials can prepare the Grade 3 learners with the necessary science skills for a successful test experience.The Sci-ReMs are aligned with the Instructional Scaffolding Theory, which uses the Zone of Proximal Development (ZPD) to bridge the cognitive gap between a learner's independent abilities and what they can achieve with guidance and support. The SciReMs provide structured assistance, offering step-by-step explanations, illustrative examples, and supportive hints to help students excel in their science

examinations. As a scaffold for science learning, Sci-ReMs provide prompt, needs-based assistance to help learners master the competenciesin science.

7. Implications

The Science Review Materials (Sci-ReMs) for Grade 3 Learners are designed to make learners understand and apply scientific concepts, thus suggesting that users of these review materials like parents and teachers would therefore be expected to actively incorporate the suggested technologies, decisions and actions in their classroom teaching strategies or home settings. Teachers may adopt activities as outlined by Sci-ReMs to assist in classwork so as to make learning funnier and suitable for young learners. Parents can use the activities recommended in the Sci-ReMs to keep alive a child's curiosity about science beyond school. They can create opportunities for hands-on experiences at home, such as simple experiments or observing natural events around them.

8. Recommendations

The validated Science Review Materials (Sci-ReMs) are recommended for use in Grade 3 classes.Teachers may conduct regular assessments and monitoring of their learners' development since they are critical for tracking gains over time and tailoring training to individual learning requirements.The curriculum developers may need to revisit the content and sequencing of topics in matter, living things and their environment, force, motion and energy, and earth and space to ensure that these align with the Grade 3 learners' science readiness and comprehension levels.The validated Science Review Materials (Sci-ReMs) may be subjected for further research study to determine its effectiveness in improving the level of mastery of Grade 3 learners in science.

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Conflict of Interest Statement

The authors of the correspondence declare that none of their known personal or financial conflicts could have influenced the article presented in this publication.

About the Authors

Anna Marie Laforteza Abes currently holds the academic rank of Teacher IIII at the Department of Education– Schools Division of Ilocos Norte, Badoc District, and Gabut Elementary School where she teaches core subjects in the primary grade. She earned her master's degree in early childhood education from Mariano Marcos State University- Graduate School.

Andrian A. Dela Cruz holds the academic rank of Assistant Professor at the Mariano Marcos State University where he teaches major and allied subjects in the Early Childhood and Special Needs Education Department. Likewise, he is an Associate Member of the National Research Council of the Philippines (NRCP) Division 1: Governmental, Educational, and International Policies. He published his research articles focusing on children's behavior, teachers's personality traits, professional development and self-efficacy, pre-service teachers' career readiness, and inclusive education in international peer-reviewed, Scopus Index and ASEAN Citation Index journals.

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